

# JOURNAL

## U.S. ARMY MEDICAL DEPARTMENT

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# JOURNAL

U.S. ARMY MEDICAL DEPARTMENT  
*A Professional Bulletin for the AMEDD Community*

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## Mentoring / Leader Development

Army Regulation 600-100, Army Leadership, states that “Leadership is the process of influencing others to accomplish the mission by providing purpose, direction, and motivation. Effective leadership transforms human potential into effective performance.” It further states, “Leader development is a process. It is the preparation of military and civilian leaders, through a progressive and sequential system of institutional training, operational assignments, and self-development, to assume leader positions and exploit the full potential.” The success of the Army leader development system relies on the two principles of both progressive and sequential life cycle models for respective developmental areas.

In many respects, the officers and noncommissioned officers in the Army Medical Department (AMEDD) do not have the typical life cycle models found in most other corps throughout the Army. Assignments to fixed facilities such as hospitals or laboratories provide environments with variable personnel and command structures. Professional development may be emphasized with little attention given to crucial military leadership skills required for future operational assignments. Junior officers may be at a distinct disadvantage to develop these skills without the proper mentorship and continuing military education.

The lead article in this issue of the AMEDD Journal, *Officer Professional Development: A Case Study in Officer Mentorship*, describes the mentorship approach to junior officers assigned to the Health Physics Program at the United States Army Center for Health Promotion and Preventive Medicine. It utilizes the concepts from AR 600-100 to develop a formal Officer Development Program. The main components include the Chief of Staff of the Army’s official reading list, military topics, health physics journal club, guest lectures, and field trips. This program provides an excellent balance between military and professional education and may serve as a template for other AMEDD units seeking to improve the leadership process.

Other articles in this issue include:

- *Mars and Hippocrates in Megapolis: Urban Combat and Medical Support.*



Major General Darrel R. Porr

This article examines the unique challenges of providing definitive medical care in the urban warfare setting, and how evacuation and treatment of casualties becomes more difficult.

- *Psychological Intervention for 9/11 Military Mental Health Responders.* The authors discuss the concept of secondary traumatic stress in mental health providers and how it can dramatically affect their ability to provide needed interventions.

- *The Impact of Managed Care on Long-Term Care.* This article evaluates community and institution-based long-term care settings and the growing need to align themselves with managed care organizations.

- *Mineral Trioxide Aggregate (MTA): Clinical Considerations.* This is an in-depth discussion of using MTA as a replacement for other endodontic sealing materials to seal and preserve pulpal tissue.

- *Ground Evacuation in the Republic of Korea.* A discussion that outlines the medical evacuation system in South Korea and the difficulties that terrain, weather, and overcrowded highways may pose in the event of hostilities.

- *Dental Readiness of Army National Guard Soldiers in the 7th Infantry Division.* In this article, the author details the extent of dental readiness in Army National Guard units mobilized for deployment.

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I am very pleased to announce the first manuscript

competition for the Spurgeon Neel Annual Award. This award, presented by the Army Medical Department Museum Foundation, recognizes the author(s) of the AMEDD Journal article that best typifies the history, legacy, and traditions of the AMEDD. I cannot think of an individual more deserving of this special honor than Major General Spurgeon Neel. His 60 years of devoted service to the AMEDD and his tremendous contribution in the development of aeromedical evacuation and field medicine have shaped much of our current AMEDD

health care doctrine.

In the following pages, you will see the Spurgeon Neel Annual Award announcement, a summary of MG Neel's distinguished AMEDD career, and a brief look at the AMEDD Museum. I encourage all of you, military and civilian, to participate in the award competition. It is a fitting tribute to MG Neel and an acknowledgement of his dedicated and selfless service to the AMEDD and the United States Army.



# ***The Spurgeon Neel Annual Award***

The Army Medical Department (AMEDD) Journal and the AMEDD Museum Foundation are pleased to announce establishment of the Spurgeon Neel Annual Award for the Journal article that best exemplifies the history, legacy, and traditions of the Army Medical Department.

Named in honor of Major General (Ret) Spurgeon H. Neel, first Commanding General of Health Services Command (now U.S. Army Medical Command) and currently, Chairman Emeritus of the AMEDD Museum Foundation, the award competition is open to all federal employees, military and civilian, as well as nongovernment civilian authors who submit manuscripts for publishing consideration by the Journal.

The award, underwritten by the AMEDD Museum Foundation, consists of a \$500 monetary prize and a special medallion, to be presented to the first winner at a Foundation-sponsored event during spring 2004.

All manuscripts submitted for publication during Calendar Year 2003 will be reviewed and evaluated by the AMEDD Journal Editorial Review Board. Those selected for consideration for the Spurgeon Neel Annual Award will also be reviewed by the Military Medical History Consultant, AMEDD Museum Foundation, who will select the winning entry. The winning author will be notified in advance and will be announced in the Jan-Feb-Mar 04 issue of the Journal. At the time of submission, a manuscript must be original work not pending publication in any other periodical. It must conform to the Writing and Submitting Guidelines published in each issue of the Journal.

Additional details concerning the Spurgeon Neel Annual Award may be obtained by contacting the Editor, AMEDD Journal ([bruce.nelson@amedd.army.mil](mailto:bruce.nelson@amedd.army.mil)) DSN 471-6916/Comm 210-221-6916.



## **Major General (Ret) Spurgeon H. Neel**



### **60 Years of Distinguished, Dedicated Service to the Army Medical Department**

Major General Neel was born and educated in Memphis, Tennessee. He entered active duty in October 1943, following his internship at Methodist Hospital in Memphis, and at the end of World War II, he was commander of a Medical Company in Europe. In the following 40 years, MG Neel was involved in all phases of field medicine and aviation medicine, including the Korean and Vietnam conflicts. He achieved full qualification in both of these areas of expertise by training with the U.S. Army and the U.S. Air Force.

Major General Neel was a pioneer in the development of the principles of aeromedical evacuation of battlefield casualties. He chaired a board that tested, evaluated, and recommended use of the helicopter in the medical evacuation role. His guidance and suggestions were implemented during the Korean conflict, with a resulting significant increase in the number of injured soldiers removed from the battlefield. Based on his further experience during that conflict, he developed medical evacuation policies, procedures, and organizations that are currently the foundation of aeromedical operations. In 1954, then-LTC Neel became the Army's first Aviation Medical Officer. The following year, he served on the Department of the Army board which conducted a design competition to select the new standard Army utility helicopter (later to become the UH-1 Iroquois). That same year he established flying status for Aviation Medical Officers (AMO) and became the first AMO to achieve that standing. While assigned to the Office of the Army Surgeon General, LTC Neel established the Aviation Branch and became its first Chief. He also created a formal program for Board certification of Army Medical Officers in Aviation medicine and laid the groundwork for the Army Aviation Medical Training and Research Program.

As the hostilities in Vietnam increased in the mid-1960s, COL Neel was assigned as the Chief Surgeon, U.S. Military Assistance Command (MACV) and Senior Medical Advisor to General William Westmoreland. He subsequently served as MACV Director of Plans, Supply, and Operations. Following his promotion to Brigadier General in 1968, he became Commanding General, 44th Medical Brigade and U.S. Army Vietnam Surgeon. Upon his return to the United States, BG, then MG, Neel was nominated to become Deputy Army Surgeon General, a post he held until 1973, when he became the first Commanding General of Health Services Command.



Following his retirement from active duty in 1977, MG Neel became one of the founding members of the Army Medical Department (AMEDD) Museum Foundation. Since then, he has played an extraordinarily valuable part in many important Museum initiatives to sustain the legacy and heritage of the AMEDD and educate the civilian and military communities on its significant contributions to the nation's health care.

During the past 25 years, MG Neel has demonstrated his strong and unwavering commitment to the nonprofit AMEDD Museum Foundation. This organization was created for the purpose of preserving AMEDD history and to promote literary, educational, and artistic endeavors through the construction of a museum to preserve the over-200 years of significant achievements in America's military medical history. His dedicated service as a Director and Chairman of the Museum Foundation Board of Directors culminated in his being named Chairman Emeritus of the Foundation Board in August 1998.

In December 2002, to recognize MG Neel's distinguished service to the Foundation and his standards of military and professional excellence, the AMEDD Museum Foundation Board of Directors established the Spurgeon Neel Annual Award for the best article published in the AMEDD Journal exemplifying the history, legacy, and traditions of the AMEDD.



# The U.S. Army Medical Department Museum



The U.S. Army Medical Department (AMEDD) Museum, located at the intersection of Harry Wurzbach Highway and Stanley Road on Fort Sam Houston, provides the installation and the San Antonio community with the Army's only premier showcase facility for the exhibition and archiving of AMEDD memorabilia and artifacts.

Originally established at Carlisle Barracks, PA in 1921, the museum was moved to Fort Sam Houston in 1946, where the only available space proved to be inadequate for the number of displays on hand. Funding for construction of military museums cannot be provided by the federal government; therefore, thousands of artifacts, including those belonging to the AMEDD, spent many years in warehouses across the United States. In 1977, a group of concerned retired AMEDD personnel, military and civilian, joined together to establish the nonprofit AMEDD Museum Foundation. For more than two decades, the Foundation has raised funds for the construction of a museum that could preserve the over-200 years of significant achievements in America's military medical history.

Built in three phases, the museum contains two spacious exhibition halls, an auditorium, gift shop, research library, administrative offices, and an artifact conservation repository. Important acquisitions include the extensive collection of Dr Edward Burka, containing artifacts dating back to the Revolutionary War. The outdoor exhibits and grounds feature a spacious Memorial Courtyard, a 1950s-era Railroad Ambulance Car, a vehicle and aircraft pergola, and the AMEDDitations Garden and Gazebo areas. The final phase of museum construction was completed in September of 2001.

The AMEDD Museum is open to the public, admission-free, Tuesday through Saturday from 1000 until 1600.

# ***Officer Professional Development: A Case Study in Officer Mentorship***

LTC Mark A. Melanson, MS, USA†  
1LT Alison D. Winstead, MS, USA††

## **Introduction**

One of the key responsibilities of leadership is the training and development of subordinates, and this includes mentoring. However, with the high operational tempo of today's Army, it is often difficult to find the time to set aside to mentor. This article describes one approach taken to foster technical and tactical excellence in junior officers assigned to the Health Physics Program (HPP) of the United States Army Center for Health Promotion and Preventive Medicine (USACHPPM). While the strategy discussed may not be fully exportable to all commands, it may provide some insights on how to tailor a mentoring program within other AMEDD units.

The USACHPPM is located on Aberdeen Proving Ground, MD. The USACHPPM's mission is to ensure promotion and protection of health for the Army worldwide. Located within the Directorate of Occupational Health Sciences at USACHPPM, the HPP retains the Center's expertise in health physics, or radiation protection. The program has 26 members including military, civilian, and contractor personnel. Of the six military assigned to the HPP, five are Medical Service Corps (MSC) officers holding the Area of Concentration (AOC) 72A, Nuclear Medical Science Officer: one lieutenant colonel (the Program Manager), three captains, and a first lieutenant.

With the exception of the Program Manager, all of the 72A officers are currently in their first duty assignment. This important fact underscored the urgent need for a formalized mentoring program that could address both officer fundamentals and enhanced technical training in health physics. Not surprising, the biggest challenge was developing such a program around deployments, temporary duty (TDY), and the ongoing distractions and demands of each duty day.

## **Officer Professional Development (OPD) Program**

Since it was first established in the summer of 2000, the HPP OPD Program has greatly evolved. While it originally began as an informal "chat session" between the HPP Program Manager and his junior officers, OPD has since become a more scholarly, formalized program. Jealously guarded by the participating officers as "their time," OPD is presently composed of weekly meetings with an early start time (0700 on Thursdays) to minimize interruptions. A constantly updated schedule is managed by one of the junior officers and any scheduling conflicts are resolved on an as needed basis. These gatherings are intentionally informal, filled with good coffee, stimulating discussions, and officer camaraderie.

It is important to note that the weekly OPD sessions are held as long as at least one junior officer is available to meet with the senior officer. Those particular sessions are specifically tailored to fit the interests of the junior officer and become a personalized, one-on-one session. For example, one such meeting focused on potential future assignments for one captain; a second session dealt with strengthening another officer's officer evaluation report support form. When the senior officer is not available, the next ranking officer leads the session, thereby reinforcing the importance of the chain of command and ensuring OPD continuity. Besides, offering the junior officers this opportunity to mentor is, in and of itself, a form of mentoring.

Presently, the OPD is comprised of four types of sessions: The Chief of Staff of the Army (CSA) Official Reading List, Military Topics, Health Physics Journal Club, and Guest Lectures. Ideally, since there are usually four Thursdays in each month, an attempt is made to vary the meeting format with one of each type of session. A brief description of the varied formats follows.



## **The CSA Official Reading List (1st Session)**

In Jun 00, General Eric K. Shinseki released a reading list to help in military professional development.<sup>1</sup> His list, containing 40 books, is divided into four focused sub-lists: one list for cadets, soldiers, and junior noncommissioned officers (NCOs); a second list for company grade officers and NCOs; another list for field grade officers and senior NCOs; and the final readings are focused towards senior NCOs and leaders above Brigade level. It was the second list, targeted for company grade officers and NCOs, which became the cornerstone of the OPD program. Smaller books are read and then discussed in their entirety during the Thursday morning sessions; larger books are broken into “bite-sized” blocks (approximately 200 – 300 pages at a time) that are read and then discussed within the allotted time of an hour and a half. If time runs out, which occasionally happens, the discussion is carried over to the next week’s session.

Traditionally, the first OPD meeting of each month is dedicated to the discussion of the CSA Official Reading List (although this can be changed based upon TDY schedules and mission requirements). Responsibility for discussing the books is rotated among the junior officers who are fully responsible for leading their sessions. In honor of this fact, the junior officer leading the discussion always sits at the proverbial head of the table.

This format combines the study of military history with enhancement of skills in preparing and leading small group discussions. Attempts are made to relate the readings to current events or Army operations (like the war on terrorism). This direct linkage serves to introduce relevance to the readings while cultivating a deeper appreciation of how the American military profession has evolved over the past three centuries. The discussions are dynamic and allow everyone ample opportunity to contribute and practice effective listening skills.

## **Military Topics (2d Session)**

Since all of the junior officers in the HPP have received direct commissions, they are all brand-new to the Army. Consequently, their prior Army experience is limited to what they learned during the brief AMEDD Officer Basic Course. Therefore, at least one OPD session each month is always dedicated to exclusively military

topics. A few examples of subjects discussed so far include ethics, values, leadership, and officer-enlisted relations. While some of these military sessions include select readings from field manuals like FM 22-100, Army Leadership, and Army professional journals such as *Military Review* and *Parameters*, others have included case studies, “war stories,” and other real-world examples. (For example, when the topic of ethics was presented, the senior officer shared personal ethical dilemmas that he faced and how he dealt with them. In this way, the discussions are more germane.) Although the senior officer chooses many of the subjects for these sessions, other topics requested by the junior officers are also integrated into the OPD curriculum. The goal of these military topics is to further junior officer development as soldiers and future Army leaders while making the process both relevant and interesting.

## **Health Physics Journal Club (3d Session)**

While 72As are MSC officers, they are also health physicists. The profession of health physics is a rigorously scientific one, requiring continuing study and practice in order to maintain technical proficiency. To assist in preserving this unique professional competence, one OPD session each month is normally dedicated to a health physics topic. Typically, this is accomplished in a Journal Club format. The Program Manager selects a pertinent article from an appropriate technical journal (such as *Health Physics* or *Operational Radiation Safety*) and the officers all read the article. Discussion during the OPD session then focuses on assigned reading and how the specific topic relates to operations within the Army. The Journal Club format is also useful for times when the Program Manager is TDY or on leave. These technical exchanges help to maintain the officers’ scientific competency while assisting them in staying abreast of ongoing developments in the profession of health physics and radiation safety.

## **Guest Lectures (4th Session)**

Finally, the OPD schedule is rounded out with guest lectures. Invited speakers to the OPD have included the USACHPPM Chief of Staff (who explained the officer promotion system and promotion boards), the USACHPPM Company Commander (who shared the challenges of a Company Command), as well as retired

Army officers (who reflected upon their diverse and distinguished careers) and senior NCOs (who discussed NCO Evaluation Reports and enlisted career management and development issues). Each of these guest speakers brings his or her unique expertise, along with a fresh perspective. These gatherings also provide some variety and acquaint the junior officers with other senior officers and potential mentors. It also allows these senior officers (typically non-72As) to participate in the shared leadership responsibility of junior officer mentorship.

## Field Trips

In addition to the weekly Thursday meetings, the OPD program also includes field trips. One important, recurring field trip is an annual pilgrimage to PERSCOM in Alexandria, VA, to meet with the 72A Career Activities Officer (CAO). This annual meeting includes a review of each officer's officer record brief (ORB) and microfiche and a discussion of upcoming promotion and retention boards and potential future assignments. The CAO makes any corrections to the officer's ORB on the spot, thereby keeping the records up-to-date. The senior officer attends these career counselings along with each of the junior officers to maintain familiarity with each individual officer's career and to offer any needed guidance.

A number of field trips have also been made to visit senior 72A officers within the Baltimore-Washington area. (This was curtailed after 11 Sep 01, but has since resumed.) These informal courtesy calls allow the junior officers to meet other senior officers in their AOC and get an idea of future assignments that they may have later in their career. On the other hand, the senior 72As get to meet the new junior officers, describe their jobs, and share their thoughts on Army officer responsibilities. It is hoped that these meetings will serve to "break the ice" and facilitate future opportunities for mentoring between these junior and senior officers.

A final component of the field trips is touring historic sites. One such example was a trip to the Pentagon (before 11 Sep 01). Another field trip included a lecture and guided tour of the Gettysburg battlefield sponsored by a local Community College. These excursions serve to complement the military history readings with "actually being there" (In addition to getting everyone out of the office for a change of scenery). Future field trips planned

include Fort McHenry, the National Cemetery at Arlington, and the U.S. Army War College. Fortunately, all of these locations are mere day trips from Aberdeen Proving Ground, MD and are, therefore, very convenient.

## Summary

Developing subordinates is a leader's inherent duty. However, finding the time to mentor in today's fast-paced Army remains an ongoing challenge. The HPP OPD program at USACHPPM is a modest attempt to effectively meet both technical and tactical development needs of junior Nuclear Medical Science Officers. Topics range from those that are purely technical in nature to exclusively military subjects. The OPD program combines scholarly reading with small group discussion and field trips. Feedback from the participating junior officers has been unanimously positive and several other junior officers outside of the HPP have made inquiries about also participating.

While implementing the OPD program has raised officer morale and esprit de corps within the HPP, it is important to note that any long-term benefits of this program may not manifest themselves for years, if at all. Perhaps, that is why mentoring is much like gardening, both age-old pursuits require an abundance of nurturing and patience.

Although the authors hold no illusions that the approach presented is a panacea for the Army's mentoring problems, we genuinely hope that some of the ideas offered here will assist others struggling to fulfill their mentoring responsibilities in today's busy Army. That being said, with minor adjustments, the format presented should be readily adaptable to fit most of the other AOCs within the AMEDD. Given the climate of the Army today and recent concerns about junior officer retention, mentoring our future leaders is even more critical than ever before. It is that simple, our junior officers deserve no less.

Finally, a long-time mentor once said nearly a quarter century ago: "You always find time for the things that are important to you and in that way you make them important." That being said, if mentorship is truly important, one will find the time to make mentoring a self-fulfilling prophecy.

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## Reference

1. General Eric K. Shinseki "From my Bookshelf." Mil Review. 2001;Vol LXXXI, No. 2, 72-78. (<http://www-cgsc.army.mil/milrev/English/MarApr01/bookshelf.htm>).

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# Mineral Trioxide Aggregate: Clinical Considerations

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## Introduction

Pulpal and periradicular pathoses are the direct result of microbial, mechanical, or chemical insult. Microorganisms are the main irritants of pulpal and periapical tissues. A hermetic seal must be placed to preserve pulpal tissue in teeth demonstrating signs of reversible pulpitis and periradicular tissues in necrotic teeth. The lack of a proper apical seal is the most frequent cause of endodontic failure.<sup>1</sup> Some innovative clinical uses for an old construction material (portland cement) have found their way into dentistry over the past decade. Mineral Trioxide Aggregate (MTA), developed by Mahmoud Torabinejad and associates at Loma Linda University in California, is one of a number of materials that attempt to provide an acceptable endodontic seal to prevent further microbial insult.

Ideal endodontic sealing materials are required to have physical properties such as short setting time, complete sealing, biocompatibility, and the ability to regenerate lost periapical tissues.<sup>2</sup> Presently, there are no materials on the market that fulfill all of these requirements. Other restorative materials have demonstrated limited success.

Amalgam has traditionally been the endodontic special-purpose material of choice. Some of amalgam's disadvantages, however, such as moisture sensitivity and corrosion, have encouraged the use of zinc oxide and eugenol-based cements such as Super-Ethoxybenzoic Acid (EBA).<sup>2</sup> Again, properties like moisture sensitivity and irritation to vital tissues have stimulated clinicians to seek improved alternatives. Resins have also been utilized. They possess good handling properties, but the sealing capability of the resin bond has been questioned, especially in the presence of moisture. The MTA was developed in an attempt to fill the void left by these other materials. This

article will describe, in more detail, the properties of MTA. Various indications for the use of MTA and clinical techniques will also be discussed.

## Physical Properties

The MTA is a powder consisting of fine hydrophilic particles of tricalcium silicate, tricalcium aluminate, tricalcium oxide, and silicate oxide. Bismuth oxide powder has also been added to provide radiopacity (slightly greater than that of dentin) and at the same time decreases the setting time. It is the Bismuth that differentiates MTA from traditional portland cement.<sup>3</sup> After being mixed into a paste-like consistency (using liquid provided or sterile water), MTA sets in about 3 hours in the presence of moisture; working time is 5 minutes (Figure 1).<sup>4</sup> While the long set time may seem like a disadvantage, it may help explain why this material demonstrates less peripheral leakage than others. The MTA has a *potential hydrogen* (pH) of 12.5 in its set state. This pH is comparable to that calcium hydroxide ( $\text{Ca}[\text{OH}]_2$ ).<sup>5</sup> This very basic pH may contribute antimicrobial properties. The compressive strength of MTA is about 67 Mpa after 21 days. This strength is comparable to Intermediate Restorative

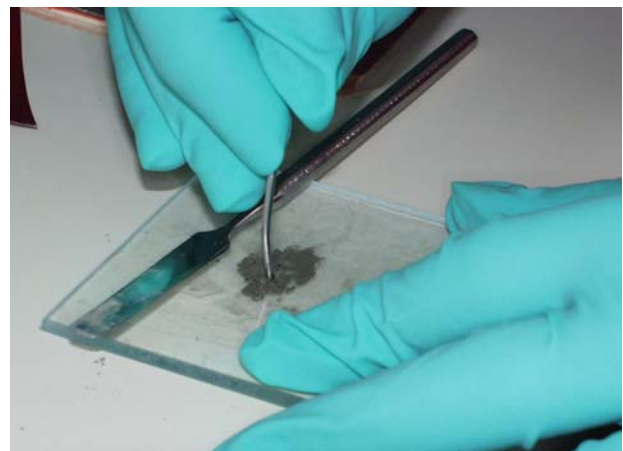


Fig 1. MTA mixed on glass slab.

Material (IRM) and Super-EBA but much less than amalgam (311 Mpa).<sup>5</sup> Due to the low compressive strength of MTA, it is not recommended as a restorative material.

### **Biocompatibility**

Kettering led a preliminary biocompatibility study demonstrating that IRM, Super-EBA, and MTA are nonmutagenic.<sup>6</sup> A cytotoxicity study conducted on freshly extracted third molars reported MTA to be less toxic to periodontal ligament fibroblasts than Super-EBA and amalgam, two common root-end filling materials.<sup>7</sup> Two in vitro human osteoblastic studies demonstrated that MTA is more than just an inert “bio-friendly” material. It has been shown that MTA has the ability to stimulate cytokine release and interleukin production, two key processes in forming hard tissues.<sup>8,9</sup> These studies demonstrate, for the first time, that it may be possible to regenerate periodontal tissues lost through periapical pathology.

### **Marginal Leakage**

In a scanning electron microscope investigation, MTA was shown to have superior marginal adaptability over amalgam, Super-EBA, and IRM.<sup>10</sup> None of the MTA samples had identifiable gaps between tooth and material. All other materials had gaps ranging from 3.8  $\mu$ m to 14.9  $\mu$ m. However, there is still debate on MTA’s superiority compared to other materials during in vitro leakage studies. Many of these studies were conducted using methylene blue dye. It has since been demonstrated that the size of normal oral flora are smaller than the dye molecule, thus a gap that inhibits dye penetration may not necessarily inhibit bacterial access.<sup>11</sup> Furthermore, a study completed in 1997 demonstrated that some materials cause methylene blue to decolor over time, which can also affect material results. Specifically, Wu reported that after 24 hours, the optical density of methylene blue decreased by 84% when in the presence of MTA.<sup>12</sup> Current bacterial studies on MTA are split almost 50/50 on MTA’s superiority. Some studies demonstrate that MTA outperforms all other materials tested.<sup>13-15</sup> Other studies report MTA is *as good* as these other materials.<sup>16-19</sup> However, there is little question that MTA performs as well as any other traditional sealing material and almost every leakage study states that MTA outperforms amalgam. A significant advantage of MTA is its ability to set in the

presence of moisture. Torabinejad’s group demonstrated that MTA is not affected by the presence of blood, whereas the setting properties of other materials are generally inhibited by blood/saliva contamination.<sup>20</sup>

### **Indications and Techniques**

Many uses have been suggested for the special purpose material, MTA. The makers of ProRoot™ (DETSPLY Tulsa Dental) list under indications: root-end filling material, apical plug during apexification, repair of root perforations, repair for internal resorption, and as a pulp capping material. Other uses suggested include: primary tooth pulpotomy, coronal barrier for nonvital bleaching, endodontic obturation, and prophylactic treatment of dens evaginatus.<sup>21-23</sup>

### **Vital Pulp-Capping**

Cox and associates investigated the biocompatibility of various materials on the pulps of monkeys.<sup>24</sup> Their results indicate that the success of pulp-capping does not depend on the material, but rather on the materials ability to prevent bacterial leakage. As previously stated, MTA has been shown to fulfill this requirement. In vitro studies also agree that MTA is as effective as Ca(OH)<sub>2</sub> in forming a dentin bridge with less pulpal inflammation.<sup>25,26</sup> Many clinicians suggest that direct pulp capping should only be done when apices are immature, but all agree that the tooth must not show any sign of irreversible pulpitis.<sup>27</sup>

### **Vital Pulp-Capping (Clinical Technique)**

Using a rubber dam, remove all caries with high speed and constant water spray. Rinse the cavity and exposure site with NaOCl. Heavy hemorrhage is controlled with a cotton pellet moistened with water. Mix the MTA following instructions. Place MTA with the carrier provided or with a large plastic amalgam carrier. Pad the mixture against the exposure site with a moist cotton pellet. The tooth should be temporized with a moist pellet in place because of the long setting time. Pulp status should be evaluated prior to placing a permanent restoration.<sup>4,28</sup>

### **Apexification**

When a tooth with a severely inflamed or necrotic

pulp has incomplete root closure, apexification is the treatment of choice. This procedure involves removal of the pulp or necrotic tissue, cleansing of the canal, and an apical plug. Das suggests control of the infection will allow the development of nonvital teeth to continue.<sup>29</sup> The MTA is a good choice of materials to form the apical plug. As earlier stated, MTA has the ability to form a predictable seal and has demonstrated its effectiveness in allowing for the formation of not only bone but cementum and periodontal ligament.<sup>8,9,30</sup>

### Apexification (Clinical Technique)

While using a rubber dam, debride the root canal system with intra-canal instruments and copious irrigation. Dry with paper points and disinfect the canal with  $\text{Ca(OH)}_2$  paste for 1 week. After 1 week, rinse the  $\text{Ca(OH)}_2$  from the canal and dry. Mix the MTA according to the instructions, place with a carrier, and condense with pluggers or paper points. A 3 mm to 5 mm plug should be confirmed by radiographic examination and a moist cotton pellet placed. After the MTA has completely set, obturate the canal and seal the coronal access.<sup>4,28</sup>

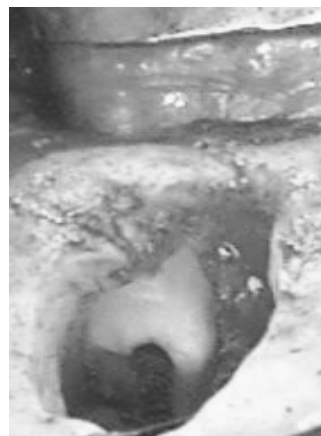
### Root-end Filler

Root-end filling materials are used to prevent the migration of irritants from the root canal system to the periapical tissues. Several materials have been used as root-end fillers following surgical apicoectomy. Some of the disadvantages of these materials include their inability to form a reliable seal, varying levels of biocompatibility, and inability to promote normal periapical tissue regeneration. When compared to amalgam in animal studies, MTA demonstrated significantly less inflammation, greater cementum formation over the MTA, and regeneration of the periapical tissues.<sup>30,31</sup>

### Root-end Filler (Clinical Technique)

Following the reflection of a soft tissue flap, ostectomy, and root-end resection, a class I root preparation should be made to a depth of 3 mm to 5 mm using ultrasonic instruments. It is key at this point that heme and moisture are well controlled. Excess moisture will make MTA's handling unmanageable. Place a mixture of MTA in the access and condense with pluggers. Remove any excess material with a wet piece of gauze

(Figure 2). Because MTA sets well in the presence of moisture, create a small amount of hemorrhage from the surrounding bone and suture the soft tissue flap. Monitor healing as indicated.<sup>4,28</sup>



*Fig 2. MTA utilized as root-end filling material.*

### Perforation Repair

Root perforations may result from typical endodontic procedures, post space preparation, or from internal resorption. Repair of these perforations are achieved from an intracoronary and/or an external surgical approach (Figures 3 and 4). For all the previously mentioned reasons, MTA is well suited for the repair of root perforations at a sub-crestal level. Pitt Ford and coworkers comparing MTA to amalgam by histological response found that inflammation is not only dependent on the material used but also by the amount of time between perforation and repair.<sup>32</sup> Perforations repaired at the same



*Fig 3. Restorative pin perforation into furcation of maxillary molar.*



appointment showed significantly less inflammation than those repaired at a later date.



Fig 4. MTA utilized for perforation repair.

### Perforation Repair (Clinical Technique)

It is best if the perforation is repaired at the same appointment it is made. Complete cleaning and shaping and obturate the canal apical to the perforation. Place MTA in the canal at the level of the perforation and condense it with a small plugger or paper points. Place a moist cotton pellet for at least 3 to 4 hours. Verify that the MTA has set hard. If the MTA is placed into an area of high inflammation, the pH may prevent the MTA from setting.<sup>4</sup> If the material is not set, wash it out and place again. At the next appointment or 3 to 4 hours later, obturate the rest of the canal system and place a permanent restoration. It is a good idea to place a  $\text{Ca}(\text{OH})_2$  paste for 1 week prior to placing MTA when repairing a perforation caused by internal resorption. A verification film should be taken. If the check film shows extruded material or the intracoronary approach failed to alleviate symptoms, a surgical approach should be attempted. The surgical approach is accomplished in a similar manner to the root-end filling procedure.

While no special purpose material is perfect, the preliminary findings on MTA are very promising. A good seal is the most important property an endodontic material can possess. The MTA has demonstrated its ability to seal as well, if not better, than other materials in its class. Biocompatibility may be the most exciting aspect of MTA. The idea that MTA may initiate the regeneration of periodontal tissues is astonishing. There are many in vitro and animal studies that support the use of MTA.

Hopefully, clinical trials will soon back up this data.<sup>4,28</sup>

### References

1. Weine FS. *Endodontic therapy*. 4th ed. CV Mosby: St Louis; 1989:p13.
2. Abedi HR, Ingle JJ. Mineral trioxide aggregate: a review of a new cement. *J Cal Dent Assoc*. 1995; 23: 36-9.
3. Estrela C, Bammann LL, Estrela CRA, et al. Antimicrobial and chemical study of MTA, Portland cement, calcium hydroxide paste, Sealapex, and Dycal. *Braz Dent J*. 2000;11:19-27.
4. Torabinejad M, Chivian N. Clinical applications of MTA. *J Endod*. 1999;25:197-205.
5. Torabinejad M, Hong CU, McDonald F, Pitt Ford TR. The physical and chemical properties of a new root-end filling material. *J Endod*. 1995; 21: 349-53.
6. Kettering JD, Torabinejad M. Investigation of mutagenicity of MTA and other commonly used root-end filling materials. *J Endod*. 1995; 21: 537-9.
7. Keiser K, Johnson CC, Tipton D. Cytotoxicity of MTA using human periodontal ligament fibroblasts. *J Endod*. 2000; 26:288-291.
8. Koh ET, Torabinejad M, Pitt Ford TR, et al. Mineral trioxide aggregate stimulates a biological response in human osteoblasts. *J Biomed Mat Res*. 1997; 37: 432-9.
9. Koh ET, McDonald F, Pitt Ford TR, Torabinejad M. Cellular response to MTA. *J Endod*. 1998; 24: 543-7.
10. Torabinejad M, Wilder Smith P, et al. Comparative investigation of marginal adaptation of MTA and other commonly used root-end filling materials. *J Endod*. 1995;21:259-299.
11. Torabinejad M, Rastegar AF, Kettering JD, Pitt Ford TR. Bacterial leakage of MTA as a root-end filling material. *J Endod*. 1995;21:109-12.
12. Wu MK, Kontakiotis EG, Wessellink PR. Decoloration of 1% methylene blue solution in contact with dental filling materials. *J Dent*. 1998;26:585-9.
13. Nakata TT, Bae KS, Baumgartner JC. Perforation repair comparing MTA and amalgam using an anaerobic bacterial leakage model. *J Endod*. 1998;24:184-6.
14. Lee SJ, Monsef M, Torabinejad M. Sealing ability of a MTA for repair of lateral root perforations. *J Endod*. 1993;19:541-4.
15. Aqrabawi J. Sealing ability of amalgam, super-EBA cement, and MTA when used as retrograde filling materials. *Braz Dent J*. 2000;188:266-8.
16. Adamo HL, Buruiana R, Schertzer L, Boylan RJ. A comparison of MTA, super-EBA, composite and amalgam as root-end filling materials using a bacterial microleakage model. *International Endod J*. 1999; 32:197-203.
17. Scheerer SQ, Steiman HR, Cohen J. A comparative evaluation of three root-end filling materials: an in vitro leakage study using *Prevotella nigrescens*. *J Endod*. 2001;27:40-2.
18. Fogel HM, Peikoff MD. Microleakage of root-end filling materials. *J Endod*. 2001;27: 456-8.
19. Adamo HL, Buruiana R, Rosenberg PA, et al. Bacterial assay of coronal microleakage: MTA, super-EBA, composite, amalgam retrofills. *J Endod*. 1996;22:196.

20. Torabinejad M, Higa RK, McKendry DJ, Pitt Ford TR. Dye leakage of four root-end filling materials: effects of blood contamination. *J Endod.* 1994;20:159-63.
21. Eidelman E, Gideon H, Fuks A. Mineral trioxide aggregate vs formocresol in pulpotomized primary molars: a preliminary report. *Ped Dent.* 2001; 23:15-8.
22. O'Sullivan SM, Hartwell GR. Obturation of a retained primary mandibular second molar using MTA: a case report. *J Endod.* 2001; 27:703-5.
23. Koh ET, Ford TR, Kariyawasam SP, et al. Prophylactic treatment of dens evaginatus using MTA. *J Endod.* 2001; 27: 540-2.
24. Cox CF, Keal CL, Keal HJ, et al. Biocompatibility of surface-sealed dental materials against exposed pulps. *Prosthet Dent.* 1987; 57:1-8.
25. Holland R, Souza V, Faraco Junior IM, et al. Reaction of rat connective tissue to implanted dentin tube filled with MTA, Portland cement or calcium hydroxide. *Braz Dent J.* 2001;12:3-8.
26. Pitt Ford TR, Torabinejad M, Abedi HR, et al. Mineral trioxide aggregate as a pulp capping material. *J Am Dent Assoc.* 1996; 127:1491-4.
27. Tronstad L, Mjor IA. Capping of the inflamed pulp. *Oral Surg.* 1972; 34: 477.
28. ProRoot™ material insert. Dentsply, Tulsa Dental.
29. Das S. Apexification in a nonvital tooth by control of infection. *J Am Dent Assoc.* 1980;100:880-881.
30. Torabinejad M, Hong CU, Lee S, et al. Investigation of MTA for root-end filling in dogs. *J Endod.* 1995; 21:603-8.
31. Torabinejad M, Pitt Ford TR, McKendry DJ, et al. Histologic assessment of MTA as root-end filling in monkeys. *J Endod.* 1997;23:225-8.
32. Pitt Ford TR, Torabinejad M, Hong CU, Kariyawasam SP. Use of MTA for repair of furcal perforations. *Oral Surg.* 1995;79:756-63.

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# Ground Evacuation in the Republic of Korea

CPT Christopher J Moore, MS, USA†

## Historical and Current Perspectives

Fifty years ago, as scores of battles raged over rugged mountains in the Republic of Korea between United States, United Nations, and Chinese Communist Forces, the 560th Ground Ambulance Company arrived to aid with the evacuation of wounded in the capacity of corps-level ground evacuation support.<sup>1</sup> Today, in a tenuous armistice inarguably favorable to combat, the 560th still stands as the most forward-deployed front line ambulance company in the U.S. Army. The company serves in direct support of the 2d Infantry Division along the most heavily defended border in the world. The 560th Ground Ambulance Company stands “Always Ready” – in true testament of our unit motto. Proud soldiers continue to sign into the unit for 1-year tours, during which time they will overcome many of the same challenges faced by those who fought to rescue the wounded during the Korean war (Figure 1).



*Fig 1. Jeep evacuating a casualty, circa 1950.*

It is possible that North Korea’s national health may have atrophied to the point that they no longer pose a significant threat of a South Korean invasion, and more importantly, Kim Jong-II can’t count on Chinese or Russian support as his father had; on the other hand, North Korean terrorism should be expected. In *The Art of War*, Sun Tzu warned of the danger inherent with an enemy who found themselves trapped on dying ground,

forced to fight for their lives. This is the most dangerous enemy described by Sun Tzu and, indeed, the perspective in which the free world should hold Kim Jong-II today, in light of his country’s poverty and waning health.

North Korea remains the most threatening proponent of state-sponsored terrorism in Asia. Indeed, in light of the aforementioned circumstances presented North Korea, terrorism could be used without immediately compromising the integrity of the North Korean state and does not require, and can be done best without, involving Beijing and Moscow.<sup>2</sup> In this light, medical planners must consider the implications of isolated mass casualty situations and the necessary flexibility of responding quickly and effectively to acts of terror.

## Application and Roles of Ground Evacuation in the Corps

Today, the 560th is joined in Korea by the 568th Ground Ambulance Company, which has responsibility for area evacuation within the Eighth United States Army area of operations. The U.S. soldiers, Korean Augmentees to the U.S. Army, and Korean Service Corpsmen of the 560th and 568th annually transport thousands of patients to higher echelons of care and negotiate over 100,000 miles of crowded and mountainous Korean road systems without accident (Figure 2).



*Fig 2. Loading an M997 front line ambulance.*



Each unit maintains a fleet of 36 wheeled vehicles, and due to personnel shortages, ambulance crews maintain not only their own individual ambulances, but also those of an entire squad. The professionalism and ingenuity of outstanding soldiers and noncommissioned officers bridge a 40% deficit in required troop strength due to each unit's professional filler system structure.

Each fully strengthened ground ambulance company has a single-lift capability for evacuation of 160 litter patients or 320 ambulatory patients. They evacuate patients from divisional, or area support, medical patients or 320 ambulatory patients. They evacuate patients from divisional, or area support, medical companies also, as well as between, aeromedical staging facilities/aeromedical staging squadrons, mobile aeromedical staging facilities, railheads, seaports, and hospitals in both the corps and echelons above corps. They may be used to augment division medical company assets and provide support beyond the capabilities of Area Support Medical Battalions and also serve as emergency movement of medical personnel and supplies.<sup>3,5</sup>

Although aeromedical evacuation is preferred in mountainous operations as well as urban operations, the scarcity of aeromedical assets places the burden of routine and less urgent patients on the ground evacuation system. Furthermore, weather, operational hazards, and the limited availability of landing zones restrict aeromedical operations in some situations and can also place increased reliance on ground ambulances and exchange points between air and ground evacuation assets.<sup>3</sup>

### **Pervading Historical Challenges**

Effective ground evacuation operations depend upon viable communications systems for command/control and adequate road networks. Korea presents formidable challenges with each of these factors. The mountains and farms of the Korean peninsula terribly impede movement. In many areas, the availability of improved, hard-surfaced roads is extremely limited. Secondary roads and trails are primitive and scarce, but they are often the only routes available to support vehicular traffic.

Korean winters challenge ambulance crews further since steep, twisting mountain roads become sheathed in ice and covered with deep snow. Winter also tests reliance

on nonstandard evacuation platforms since most cargo-style vehicles considered for this task are open-air or unheated and highly unsuitable for moving injured men in bitter cold.

Endless rises and corrugated ridgelines mercilessly hinder short wave communications throughout the peninsula. These factors can literally destroy command and control of ambulances while executing individual missions. In some situations, complicated retransmitting by crews along shortened distances between ambulance exchange points offer the best solution to this challenge. Ambulance drivers need extensive pre-mission briefs, including detailed strip maps, overlays, and specific instructions on what to do in various situations such as vehicle breakdowns or lost radio contact.

### **Unique Modern Challenges**

Almost 46 million people now populate South Korea, a number that has doubled since the Korean conflict. The South Korean capital of Seoul has a population density of almost 20 people per square meter. That figure is not a mistake, but a staggering fact made possible by the incredible vertical urban expansion that all major South Korean cities have seen in recent years. The automobile manufacturing industry has exploded proportionately with the population and both drastically exceed the country's road system capacity. The average speed on major highway systems tops out at about 15 mph. There are now 25 times as many motor vehicle accidents as there were when the armistice was signed, almost 300,000 per year (Figure 3).<sup>4</sup>



*Fig 3. Mild Korean traffic.*

These changes present challenges to military operations in urban terrain as never before. Effective communications are degraded in urban terrain just as they are in the mountains. Line-of-sight radios are ineffective. Patient collecting points must be preplanned and established at relatively secure areas accessible to both ground and air ambulances, by unmistakable landmarks, and must allow for rapid turnaround of ambulances.

Rubble, debris, barricades, and destroyed roadways would likely complicate ground evacuation in urban areas. Land navigation with most tactical maps proves to be difficult, but using commercial city maps when available can aid in establishing evacuation routes. Also, as in mountainous terrain, ground ambulances may also be the only alternative when enemy air defense capabilities and terrain features, both natural and man-made, within and adjacent to the built-up areas complicate aeromedical evacuation. Aeromedical evacuation is the preferred means of evacuation in urban areas, but is highly restricted to movement channeled over secured areas, down wide roads, and open areas. Helicopters also face hazards such as telephone and electrical wires, antenna hazards, and limited landing zone availability.<sup>5</sup> The significant threat of chemical weapons and guerilla tactics also require the medical planner to add further emphasis to chemical defense, survival, and force protection readiness.

## Conclusion

Evacuation is a critical imperative to the Army Medical Department's mission to save lives. The medical

support system relies on the efficient evacuation of casualties from the battlefield to supporting medical facilities capable of receiving, holding, and treating those casualties to ensure the synchronization of medical resources. The challenges that Korea poses to medical evacuation are still present despite the remarkable advances in medicine and technology since the Korean War. The momentous industrialization of South Korea has actually created even more challenges for medical planners. For all these reasons, Korea has remained a demanding theater for U.S. Army medical evacuation.

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## References

1. Cowdrey. *The Medics' War*. Washington: Center of Military History; 1987: p 99.
2. Harmon C. *Terrorism Today*. Frank Cass: London; 2000: p 159.
3. FM 8-10-6, Medical Evacuation in a Theater of Operations. Washington: DA; 2000: p 5-1.
4. National Statistic Office of Korea. [www.nso.go.kr](http://www.nso.go.kr). 2001.
5. FM 8-10-6, Medical Evacuation in a Theater of Operations; p 5-22.

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# ***Mars and Hippocrates in Megapolis: Urban Combat and Medical Support***

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## **Introduction**

“Don’t go there” is the conventional wisdom for military forces and cities. However, with the advent of high-precision weapons, many of the world’s forces can no longer maneuver freely on open terrain and have been forced to move to difficult terrain to negate the effectiveness of high-precision weaponry and to regain movement. Forests, jungle, mountains, swamp, and cities have long been the terrain of choice for less-technologically equipped forces to maximize their situational awareness and combat capabilities. The U.S. Armed Forces may have to fight guerrillas, paramilitary forces, or conventional forces in cities. Military medical support will share the burden of this tough fight. Casualties may be high. Last summer, a specially trained 980-man Marine Corps force “fought” a 160-man opposing force during an urban exercise in California. The Marines eventually took the housing area at a loss of some 100 casualties.<sup>1</sup> Compared to earlier urban exercises, Marine casualties were light, but the exercise was not a protracted conflict – which urban combat is likely to be.

Is there a unique role that military medicine will play in support of urban combat? The physician will still remove bullets and shrapnel or treat burns and disease. However, medical support to the combatants will pose some special tactical problems, particularly with finding the wounded, evacuating the patient, types of injuries encountered, preventive medicine, medical intelligence, and protection of medical facilities and patients.

## **Finding the Wounded**

Many cities of the world are not laid out neatly in uniform rectangular blocks. Their streets twist and turn and they are easy to get lost in. Fighting further complicates “staying found.” Units fragment during urban combat. A battalion may start its advance at one end of a block, clearing rooms and occupying buildings to prevent

the enemy from retaking them. By the end of the block, the battalion is spread out and its combat power dissipated. Even platoon leaders have trouble maintaining control as their squads move into buildings – out of sight and often out of radio and voice contact. Urban combat is truly a squad leader’s fight and even the squad gets split up. Inevitably, soldiers or marines are moving alone or in pairs. If the command has failed to establish frequent rally points and brief the plan in detail to everyone, it is easy to get turned around and lost. Eventually, a soldier or marine is missing and his comrades try to determine when and where they saw him last. Does the platoon stop and retrace its steps looking for him or does it continue on with the mission? If the platoon goes on, the platoon medic is in a quandary. Does he go back and look for the missing man or does he stay with the platoon?<sup>2</sup>

Clearly, well before the platoon moves into the city, every member needs to be trained to administer first aid to himself and to carry sufficient medical supplies to take care of himself. Soldiers and marines are trained primarily to give first aid to others, so the act of self-administered first aid can be daunting to someone who is bleeding badly and slipping into shock. Training helps, but self-administered first aid is still tough to do. Perhaps science can help in this area. The Defense Advanced Research Products Agency is considering the development of an electronically controlled medical bodysuit that could actively assist in keeping the wounded soldier alive. Conceivably, such a suit could provide pressure on dressings where needed, create a tourniquet for an injured limb, stiffen and tighten around a limb to provide a temporary splint, treat the wearer for shock, monitor life signs and administer sedatives, nutrients, and painkillers. Development and fielding such a suit will take time. Something that is needed now that can be fielded more quickly is a tourniquet that can be put on with one hand.<sup>3</sup> Another promising technology is a bandage coated with clotting agents to stop bleeding more effectively. The so-called fibrin bandages should be available relatively soon



once Food and Drug Administration approval is granted. Tourniquets and fibrin bandages are important since extremity injuries are common in urban combat and the possibility of bleeding to death is elevated.<sup>4</sup>

Buddy aid will still be the cornerstone of care in the urban arena. However, the extent and complexity of buddy aid training needs to increase substantially. The ability to preserve life until more sophisticated care can be delivered will require soldiers to become proficient in the basic “ABC’s” of first aid – airway control, breathing support, and circulation support.

Should the wounded soldier administer first aid to himself, how do the medic and the platoon find their missing member?<sup>5</sup> Finding an unconscious soldier in a city can be difficult, particularly if there has been a fight producing rubble, falling walls, and blocked entrances. Fighting can also change the terrain a unit has passed over, making it hard to find familiar landmarks and to recognize sites. Personal Global Positioning System transponders are one possible answer, but cities are notorious for electronic dead space. Further, the enemy can read the electronic map of personnel locations as readily as the friendly force; this would provide a great source of intelligence to the enemy. If the transponder is only activated when the soldier is wounded, the wounded soldier has to be able to turn it on before losing consciousness. And, of course, the enemy would love to get a transponder from a dead soldier to use in baiting an ambush. Whistles and infrared strobe lights have the same drawbacks.

## Evacuation

Once the wounded soldier is located, the next problem is evacuation. How does a platoon move an injured comrade from the 12th floor of a rubble-strewn building or from out of a collapsed storm sewer to a patient collecting point? Sledgehammers, axes, crowbars, ropes, harnesses, pulleys, jacks, pry bars, ladders, and carbide-tipped chain saws may be necessary to extract the wounded. Who maintains and carries this equipment? Who is trained to use it? How does the medic ensure that the wounded soldier survives the initial evacuation efforts? Most likely the medic is on foot. Does he lug a stretcher along or rely on an improvised poncho litter? Who carries the stretcher? The platoon has a full-time fight on its hands and the litter team should probably include a security element. Six people are usually essential for carrying a

litter over a long distance. Pulling a litter team and security element out of a platoon seriously degrades its combat strength. Therefore, prior to the action, the battalion medical element should be augmented with litter and security teams. Who provides this augmentation and who trains the augmentees?

Medical evacuation helicopters may be unable to fly into the city. During the 1994-1995 Battle for Grozny, the Chechens shot down several Russian medical evacuation helicopters, forcing the Russians to resort to ground evacuation within the confines of the city. Ground evacuation from the patient collection points was by field ambulance. The Chechens also shot up numerous soft-sided ambulances, forcing the Russians to use BTR-80 wheeled armored personnel carriers to evacuate the wounded.<sup>6</sup> The BTR-80 is a poor ambulance. Entry is by small side doors and there is no way to carry a litter patient. What the Russians clearly needed was an armored ambulance. The venerable U.S. Army M113 personnel carrier makes a better ambulance, but its tracks tear up communications wire laid on the ground – the primary way of effectively communicating in a city. Analysis of U.S. fighting in Mogadishu suggests that the armored ambulance must offer protection from small-arms fire, be hardened against rocket-propelled grenade fire, be able to move through or over roadblocks, and be armed to protect patients and medical personnel.<sup>7</sup>

Urban combat forces a step back in time when dealing with medical evacuation. Litter evacuation will be common. Air evacuation will wait until the patient is moved to a safe location, possibly out of the city. Communication will be difficult due to the incompatibility of tactical radios and high-rise buildings. Urban combat lengthens the time between injury and surgical treatment. Most of the U.S. casualties in Mogadishu took up to 15 hours to evacuate to surgical treatment.<sup>8</sup> The perennial problem of stabilizing the patient is compounded by the fact that evacuation now takes longer and the patient needs to be kept stabilized longer. Shock and loss of blood will significantly complicate the treatment of wounded waiting evacuation. Further, the delay to surgery will increase the amount of subsequent infections and increase the need for the early administration of antibiotics.<sup>9</sup> Research is currently underway to evaluate the efficacy of the early administration of oral antibiotics in the field. It is likely that in the near future, a wounded soldier will take or be given

an oral antibiotic such as ciprofloxacin shortly after being injured.

Evacuation of casualties will be a challenge and given the complexities of urban combat, it may well be an insurmountable hurdle. Nevertheless, the primary objective remains to decrease mortality from battlefield injuries, not necessarily evacuating the injured. If sophisticated care could be quickly delivered near the scene of the injury, the need for early evacuation and all of the accompanying problems may be significantly reduced. This could be accomplished by increasing the level of care provided at squad and platoon level, improving basic care (bleeding and breathing) with advanced technologies, and finally providing advanced care far forward utilizing a very small footprint. Once the patient and the battlefield are stabilized, evacuation in a more controlled fashion could be attempted.

### Type of Injuries

Urban combat produces a higher percentage of burns and shrapnel wounds as well as crushing injuries from falling walls. Many patients will be dehydrated. Psychiatric casualties may be much higher than normal. With the advent of effective body armor, wounds to the torso have fallen off while wounds to the unprotected portion of the head and to the extremities have increased. Russian casualties during the first Chechen War of the last century (Dec 94 - Oct 96) may be instructional. Although the Russian figures are not split between urban and mountain combat, a great deal of the war was fought in the cities of Grozny, Shali, Gudermes, Vedeno, Urus-Martan, and Argun. Furthermore, 28.6% of the almost 14,000 Russian wounded and injured in the war occurred in the initial fighting in Grozny from 31 Dec 94 to 20 Jan 95.<sup>10</sup> Therefore, these figures can be used as a start point.

The physicians had to treat wounds, trauma, burns, and cold-weather injuries. Table 1 shows the percentage of each treated and the loss rate among those treated.

Wounded patients were the majority among the injured. Table 2 clearly demonstrates the efficacy of body armor in protecting the torso.

Of the above wounds, 17% were multiple wounds and 12% were compound wounds. The Russians note that

the main difference between their Afghanistan War statistics and these is that there was a higher incidence of bullet wounds to the head and neck during the urban combat phase of the war.<sup>13</sup> However, mortars remain a major, if not the chief, casualty producer during urban combat.

Type of Injury	Number	Percent of total	Died despite treatment	Percent
Wounds	8319	60.5	117	1.4
Blunt Trauma	4665	34.0	32	0.7
Burns	542	3.9	15	2.8
Cold Weather Injury	213	1.6	1	0.5
Total	13739	100	165	1.2

*Table 1. Medically Treated Injuries During the First Chechen War and Loss Rate<sup>11</sup>*

Wound Location	Percent of total	Light wounds	Medium wounds	Severe wounds
Head	19.8	32.9	28.3	38.8
Neck	1.7	37.9	32.5	29.6
Spine	1.2	9.7	19.9	70.4
Chest	6.6	29.0	34.0	37.0
Abdomen	3.2	34.7	31.5	33.8
Arms	22.9	48.3	15.2	36.5
Legs	39.9	47.5	24.5	28.0
Total	100.00	42.0	26.9	31.1

*Table 2. Location of Wounds and Percentages of Each Among Russian Military Wounded in Chechnya 1994-1996<sup>12</sup>*

The Russians experienced delays and difficulties in treating and evacuating the wounded. Among the wounded that required surgical care, 64.1% received first aid within 35 minutes of being wounded while 18.2 % of the wounded received first responder (medic) treatment within 55 minutes of being wounded. A doctor saw 56.2% of the wounded within two and one half hours.<sup>14</sup> Table 3 shows the percentage of doctor-initiated first aid procedures that were required and actually performed among 1,030 wounded.

Medical Procedure	Percentage requiring Physician First Aid Procedure	Percentage receiving Physician First Aid Procedure
Eliminate asphyxia	1.7	0.8
Stop external bleeding	15.9	15.9
Use of a tourniquet	3.5	3.5
Administer IV fluids	50.6	25.3
Remove air from pleural cavity in a tension pneumothorax	1.0	0.5
Seal an open pneumothorax with an occlusive dressing	5.4	4.3
Administer novocaine blocks	36.7	15.9
Administer analgesics	100.0	80.3
Immobilize the patient for transport	49.7	33.2
Amputate an extremity which is hanging by a flap of skin	0.9	0.9
Restore urination	3.0	3.0
Administer antibiotics	88.9	72.3
Administer tetanic antitoxin	100.0	78.1
Administer oxygen	5.3	0.3

*Table 3. Physician First Aid Required and Given to Wounded<sup>15</sup>*

Russian field hospital surgical care to the wounded was divided into emergency surgery, urgent surgery, and deferred surgery. On average, emergency surgery was performed within an hour and 24 minutes of the patient's arrival at the hospital and 73.8% of the cases involved abdominal and chest wounds.<sup>16</sup> Table 4 shows the types of emergency surgery as a percentage of all emergency surgery and the average time required to perform the surgery.

On average, urgent surgery was performed within 1 hour and 48 minutes of the arrival of the patient in the field hospital. The most common procedures were trepanation

to treat cerebral compression (20.8%), thoracentesis for a hemothorax (42.5%), and laparotomy while treating damaged hollow organs (17%).<sup>18</sup> Table 5 shows the types of Russian urgent surgery as a percentage of all urgent surgery and the average time required to perform the surgery.

Type of operation	Percentage of total	Surgical time
Tracheotomy to treat asphyxia	0.7	30 minutes
Trepanation of the skull in the presence of external bleeding	2.1	138 ± 24 minutes
Stop external hemorrhage by ligature	1.4	96 ± 36 minutes
Stop external hemorrhage without suturing vessels	3.8	78 ± 12 minutes
Stop external bleeding by suturing vessels	3.1	144 ± 24 minutes
Stop external bleeding by temporary prosthetization of a blood vessel	1.8	114 ± 24 minutes
Enucleation of the eyeball when there is uncontrolled bleeding	0.3	48 minutes
Thoracotomy due to a cardiac tamponade	0.3	90 minutes
Thoracotomy due to uncontrolled pleural bleeding	3.4	204 ± 42 minutes
Thoracentesis for a tension pneumothorax	6.6	30 ± 6 minutes
Suturing a chest wound during an open pneumothorax	9.3	48 ± 6 minutes
Laparotomy while stopping an internal abdominal hemorrhage	54.1	270 ± 114 minutes
Amputation of severed or destroyed extremities	13.1	72 ± 18 minutes
Total	100	186 ± 66 minutes

*Table 4. Types, Frequency, and Time Required for Emergency Surgery<sup>17</sup>*

On average, deferred surgery was performed within 3 hours and 18 minutes of the arrival of the patient in the field hospital. The most common procedures were initial surgery for soft tissue wounds (41.3%) and surgery to repair gunshot wounds to the long tubular bones.<sup>20</sup> Table 6

Type of intervention	Percentage of total	Surgical time
Trepanation to treat cerebral compression	20.8	126 ± 6 minutes
Initial surgery and immobilizing broken jaw bone	0.9	60 minutes
Initial surgery for a penetrating wound to the nasal sinuses	0.9	60 minutes
Thoracentesis for a hemothorax	42.3	36 ± 6 minutes
Laparotomy while treating damaged hollow organs (intestines, bladder)	17.0	138 ± 6 minutes
Surgery for extraperitoneal injury to the rectum	3.3	132 ± 24 minutes
Surgery for extraperitoneal injury to the bladder	2.4	180 ± 18 minutes
Surgery for injury to the urethra	0.5	120 minutes
Final restoration of blood vessels during ischemia of the extremities	2.4	108 ± 18 minutes
Temporary prosthetization of blood vessels during ischemia of the extremities	2.4	120 ± 36 minutes
Amputation due to irreversible ischemia	3.8	150 ± 12 minutes
Initial surgical treatment of extensive and dirty wounds	3.3	108 ± 18 minutes
Total	100	84 ± 6 minutes

*Table 5. Types, Frequency, and Time Required for Urgent Surgery<sup>19</sup>*

shows the types of Russian deferred surgery as a percentage of all deferred surgery and the average time required to perform the surgery.

There is a new type of blunt trauma that has entered the urban arena. In the Second Chechen War, the Russians introduced the use of quantities of fuel-air or thermobaric weapons during the fight for Grozny from Dec 99 to Mar 00. Fuel-air weapons work by initially detonating a scattering charge within a warhead. The warhead contents

Type of Operation	Percentage of total	Surgical time
Initial surgical repair of skull and brain injuries	6.5	84 ± 12 minutes
Initial surgical repair of facial and jaw wounds	1.8	54 ± 12 minutes
Eye surgery	1.3	72 ± 18 minutes
Decompression lamination to treat spinal compression	0.3	210 minutes
Initial surgery for soft tissue wounds	41.4	72 ± 18 minutes
Initial surgery to repair bone injuries without fixation of fragments	41.4	72 ± 12 minutes
Initial surgery for bone injuries including fixation of fragments	7.3	74 ± 12 minutes
Total	100	54 ± 6 minutes

*Table 6. Types, Frequency, and Time Required for Deferred Surgery*

(volatile gases, liquids, or finely powdered explosives) form an aerosol cloud. This cloud is then ignited and the subsequent fireball sears the surrounding area while consuming the oxygen. The lack of oxygen creates a vacuum and subsequent enormous overpressure that is the primary casualty-producing force. Within several dozen microseconds, the pressure at the center of the explosion can reach 427 pounds per square inch (normal atmospheric pressure at sea level is 14.7 pounds per square inch). This is 1.5 to 2 times greater than the overpressure caused by conventional explosives. Personnel under the cloud are crushed to death.<sup>22</sup>

There is little written about the results of the Russian fuel-air weapons used against the Chechens. However, the results are intuitive. Personnel caught under the blast die immediately from flame and overpressure. Personnel on the periphery of the blast are subject to burns, broken bones, contusions from flying debris, and blindness. Air embolism within blood vessels, concussions, multiple internal hemorrhages in the liver and spleen, collapsed lungs, ruptured eardrums and eyes displaced from their sockets are also likely. Peritonitis can result from displacement and tearing of the internal organs. While military medics are well trained in treating casualties with



external injuries (stop the bleeding, protect the wound, treat for shock), the internal injuries caused by fuel-air weapons may go unnoticed. Corpsmen should train to look for evidence of blast injuries such as the presence of fluid or blood behind the eardrums as a possible indicator of pulmonary complications.<sup>23</sup> Air evacuation of fuel-air casualties will be problematic without cabin pressurization.

Weapons of mass effect (chemical, biological, and even nuclear) may be used in cities with devastating effect. Combatants and civilians are massed in a limited area where the weapon's effects can be devastating. Medical personnel may have to perform mass casualty treatment while wearing chemical suits and protective masks.

### **Preventive Medicine**

Disease was a major problem for the Russians engaged in urban combat in Chechnya. The difficulty in maintaining proper field sanitation in urban combat meant that 95% of infectious disease among Russian combatants was passed through oral-fecal transmission. Over half of the intestinally-related infections (53.2%) were from viral hepatitis, while 27.7% were from shigellosis and 20.1% were from enterocolitis. Diphtheria, cholera, malignant anthrax, and plague also found victims among the Russian soldiers. Dirty water was the main culprit in the transmission of hepatitis. Medical records of one Russian brigade show that 15% of the brigade was down with hepatitis at one time.<sup>24</sup>

The Russian Army is not the only Army with a disease problem. In Vietnam, over two-thirds of U.S. Army hospital admissions were for disease. In 1968, disease cost U.S. forces some 943,809 man-days – roughly the equivalent of an infantry division for 2 months.<sup>25</sup> Urban combat will provide unique challenges for epidemiologic control. Unburied bodies, broken sewers, polluted water supplies, local foodstuffs, exotic beverages, rats, insects, and feral animals all represent threats to the health of the force. Increased efforts in vaccine development will be important to limit the threat of these diseases. However, efforts and policies to vaccinate the local populace will also be important. Although there may be a significant financial cost to vaccinate a large city against illnesses such as hepatitis, the long-term savings may offset the initial expense.

### **Medical Intelligence**

Urban medical intelligence starts well before the force enters the city. A good epidemiologic profile will prompt precautions and preventive measures. A good medical survey will pinpoint existing hospitals, clinics, sanitariums, blood banks, pharmaceutical industries, medical supply warehouses, veterinary facilities, and public health facilities and identify key indigenous medical personnel. The survey will also identify potential areas of health risk such as chemical plants, refineries, smelters, and waste disposal areas. Modern mapping programs will allow medical intelligence personnel to post survey data and other pertinent data – such as the location of contagious disease outbreaks, high-speed routes to medical facilities, underground locations suitable for setting up a field hospital – on electronic and printed maps.

Intelligence on the enemy medical status is also valuable. Not only does it disclose enemy strengths and weaknesses, but it can also alert friendly medical units as to what diseases and conditions enemy prisoners of war might require treatment for. Part of medical intelligence can be determined before entry into the city, but most of it will be developed once the force is committed. Medical personnel are a prime source of intelligence provided that they are trained on how to observe and report pertinent data. Types and frequency of wounds and disease, attitudes of enemy prisoners undergoing treatment, type and utility of captured enemy medical supplies and observations of the local populace are all important sources of intelligence that medical personnel should provide.<sup>26</sup>

Medical intelligence will also be invaluable to detect the use of chemical or biological weapons. These agents may be more difficult to detect in urban areas specifically because of the closeness of the population, the sanitary problems associated with cities, and the general breakdown of support services and infrastructure.

### **Protection of Medical Facilities and Patients**

Medical facilities must be protected. Frequently, their best location is outside the city near major roads and an airfield or port. However, medical facilities will often be located inside the contested city as well. Obviously, the best place to establish a medical facility is often inside an

established hospital or clinic. However, civilian medical facilities are often overcrowded in peacetime. Fighting will make them more so. Space and security concerns will usually dictate that military and civilian medical facilities are in separate locations. Use of foreign health care facilities may be complicated by sub-standard facilities when compared to accepted standards of care. Also, medical systems may not be compatible. These types of problems are common at U.S. cities that have well developed hospital systems, so one can imagine how difficult this would be in a foreign city.

A thinking enemy will identify urban sites that U.S. forces are likely to use for headquarters, facilities, and hospitals. They will target these and may booby trap or mine them. Sites should be carefully checked and protected. Protection of patients is a primary military concern, so sturdy buildings with clean basements are often prime locations. However, if chemical weapons are used, many chemical agents tend to hug low places. The medical facility should be secure from ground attack as well as mortar and artillery attack. The top floors of most buildings are vulnerable to artillery and mortar fire, so the medical facilities should occupy the lower floors and basement. Enemy prisoners of war will often be treated in the same facility as friendly troops, so establishment of secure prison wards will be an immediate concern.

Protection of patients goes beyond the medical facility. Patient protection extends from the initial litter evacuation to flying a patient to a permanent medical facility. Litter protection parties, armored ambulances, well-patrolled evacuation routes, and secure helipads all contribute.

### **Street Smarts**

Armies avoid cities for a good reason. Cities are difficult to fight in and take an inordinate number of troops. However, the reluctance of an Army to fight in a city is an incentive for an enemy to use it as a refuge. Sometimes urban combat cannot be avoided. Urban combat places extra demands on military medicine. Military medical personnel may find themselves fully involved in supporting the civilian community as well their own military and enemy prisoners of war.

A separate issue is providing medical care within a

coalition. The U.S. force may be fighting alongside allies and have to provide medical care for allied personnel. Differences in culture, diet, and accepted medical procedures may present difficulties to U.S. medical personnel. In order to minimize the difficulties they are likely to encounter in coalition warfare, coalition staffs should have medical officers who can work and plan together to minimize these problems. Medical command and control will not happen without prior planning and training. Often, medical personnel may have to conduct medical work-ups and diagnoses or coordinate large-scale medical support using an interpreter who has a limited medical vocabulary in either language. Again, with prior planning and training, the impact of these language and cultural barriers can be minimized, if not removed all together.

The nature of the large city will have a decided impact on the missions of military medicine. Much of the urban population cannot abandon the city. There simply is no place for all of them to go. Where would the populace of New York or Los Angeles go? There are even fewer options when dealing with the evacuation of the civilian populace of Mexico City, Lagos, Cairo, or Rawalpindi. Most civilians will stay in place, try to protect their property, and try to avoid the fighting. Defenders often will not let civilians leave, since they restrict the capability of the attacker. Civilians won't be able to stay out of harm's way. Some will become combatants. The bulk of casualties in city fighting are usually civilians. Sewage systems, power generating plants, water treatment plants and other utilities are vulnerable and, when knocked out, increase the risk of disease and epidemics. A breakdown in public safety, city services and public health can lead to looting, further disease, riots, unchecked conflagrations, and untreated casualties. Any fighting will interrupt normal commerce and severe interruptions can stop the delivery of medicine, food, and fuel. The populace will look to government and local authority to restore power, sewage, good order, public health, transport, and essential commerce. Often, government and local authority is represented solely by the military and the senior military commander will find that his responsibilities extend far beyond immediate combat. Military engineers, communicators, police, transporters, lawyers, civil affairs, and medical personnel may find themselves doing nontraditional, yet vital tasks to support the senior commander in the struggle for the city.

On the operational side, military medical personnel may find themselves reestablishing city public health systems, operating clinics for civilians, training public health workers, conducting or supervising epidemiologic teams, checking water and food, restocking local hospitals, working with nongovernment relief and charitable organizations, and other aid organizations while continuing their primary mission of supporting the military. Clearly, the medical effort will require additional resources to handle an expanded mission and provide aid to the civilian community. Triage efforts may deal with civilians and military simultaneously.

Urban combat is difficult – and so is medical support to that combat. However, with training, preparation and foresight, both can be managed.

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## References

1. Peterson S. "Iraq Prepares for Urban Warfare: as Congress moves to approve a military strike, Iraq says the lesson of 1991 is stay out of the desert." *Christian Science Monitor*. October 4, 2002:1.
2. Water Henry J. "Medical Implications of Combat in Cities," Student Research Report for the U.S. Army Command and General Staff College. April 1974:5.
3. Conversations with Dr Jacob Kipp, Foreign Military Studies Office.
4. Leitch R. "'The three block war': urban combat." *U.S. Med Info Cent*. February 2001.
5. Waters, 5.
6. Savvin Y. "Za zhizni voynov" [For the lives of the warriors]. *Armeyskiy sbornik* [Army Digest]. March 1995:45.
7. Butler FK, Hagmann JH, Richards DT, ed. "Tactical Management of Urban Warfare Casualties in Special Operations," Supplement to Mil Med. April 2000; Vol 165, No. 4:2.
8. Butler, et al, 2.
9. Ibid, 3.
10. Efimenko NA, Gumanenko EK, Samovalov IM, Trusov AA. "Khirurgicheskaya pomoshch' ranenym v vooruzhenom konflikte: Organizatsiya I sodержanie pervoy, dovrachebnoy I pervoy vrachebnoy pomoshchi (Soobshchenie pervoye)" [Surgical care of casualties in an armed conflict: Structure and stages (Initial report)]. *Voenno-meditsinskiy zhurnal*. [Military-medical journal]. June 1999:25.
11. Bryusov PG, Khrupkin VI. "Opyt organizatsii khirurgicheskoy pomoshchi v period boevykh deystviy v Chechenskoy respublike." [Experience in organizing surgical support during the combat in the Chechen republic]. *Voenno-meditsinskiy zhurnal*. [Military-medical journal]. June 1997:11.
12. Bryusov and Khrupkin; 7.
13. Ibid.
14. Efimenko, Gumanenko, Samovalov and Trusov. June, 27.
15. Ibid, 29.
16. Efimenko NA, Gumanenko EK, Samovalov IM, Trusov AA. "Khirurgicheskaya pomoshch' ranenym v vooruzhenom konflikte: Organizatsiya I sodержanie pervoy, dovrachebnoy I pervoy vrachebnoy nomoshchi (Coobshchenie pervoe)" [Surgical care of casualties in an armed conflict: Structure and stages (Continuation)]. *Voenno-meditsinskiy zhurnal*. [Military-medical journal]. September 1999:26.
17. Ibid.
18. Ibid.
19. Ibid, 27.
20. Ibid, 26-27.
21. Ibid, 27.
22. Grau LW, Smith T. "A 'Crushing' Victory: Fuel-Air Explosives and Grozny 2000." *Marine Corps Gazette*. August 2000;30.
23. Grau and Smith, 32-33.
24. Grau LW, Jorgensen WA. "Viral Hepatitis and Russian War in Chechnya." *AMEDD J*. May/June 1997;2-4.
25. Neel Spurgeon. Medical Support of the U.S. Army-Vietnam 1965-1970. (U.S. Army Historical Series). Washington: USGPO; 1972:33 cited in Waters, 11.
26. Waters, 11-12.

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# The Impact of Managed Care on Long-Term Care

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*The impact of managed care on long-term care (LTC) is significant. Managed care's penetration in the American health care system is not statistically great, but it continues to grow. Numerous LTC facilities recognize the need for affiliating with a managed care organization (MCO) but are finding out that they are not prepared. In order to meet the requirements for contracting with the MCOs, organizations are developing information systems to manage financial and clinical outcome data, developing and implementing clinical pathways, and seeking certification and accreditation from national organizations such as the Joint Commission on Accreditation of Healthcare Organizations (JCAHO). In preparing to compete for managed care contracts, many separate facilities are finding that they need to band together creating the continuum of care desired by MCOs. This continuum facilitates good quality care and is a great benefit to the payer, the patient, and the providing organizations. Partnering with MCOs may not be an easy proposition, but managed care has had a positive impact on LTC to this point.*

## Introduction

The LTC, in the most basic sense, literally covers the health care needs of a person from the cradle to the grave. A more specific definition, and the manner in which this article will refer to LTC, "is a set of health, personal care, and social services delivered over a sustained period of time to persons who have lost or never acquired some degree of functional capacity."<sup>1</sup> Generally, when a person hears the term LTC they immediately think of their grandparents. Although LTC is dominated by and most often spoken in reference to those over 65 years of age, the reality is that many young children and young adults also require the same type of services. Thanks to science, disease control measures and cures may reduce the number of younger people using LTC resources, but the aging population dictates a growing need for the variety of services found under the LTC umbrella. This article will briefly familiarize the reader with many of the different types of LTC services, introduce managed care as a means of monitoring the delivery of care, provide an industry perspective, illustrate the impact managed care has had to this point, and offer some challenges for the future.

## Types of LTC Services

The LTC programs are categorized by the location where the service is rendered. The two basic types of LTC care are community-based and institution-based. Community-based services include adult day care, home

care, hospice, and respite care programs. As the title suggests, community-based care is provided outside the formal settings of a hospital or like institution. Home care is increasingly becoming the recovery method of choice for many Americans. Many people prefer to leave the institutional setting and recover in familiar surroundings. Home care is delivered either formally by professional caregivers (registered nurses, licensed practical nurses, or home health aides) or informally by family and friends. The preference for hospice patients in the U.S. is in-home care.<sup>2</sup> Care for the terminally ill is difficult on family members, both physically and mentally. To make things easier, adult day care and respite services offer an opportunity to temporarily transfer the care in order to take time, decompress, and prepare to face the daily rigors again. Hospice and respite care may also be classified as an institution-based service if that is where the care is delivered.

Institution-based services are those rendered in residential care or skilled nursing facilities, provided within a "hospital with inpatient extended-care or rehabilitation facility, or inpatient hospice."<sup>2, p206</sup> Because all of these locations provide extended stays, the care recipients are referred to as residents rather than patients. When people read or write about LTC, skilled nursing facilities (SNF) are most often the topic of discussion. Most Americans are familiar with the concept either through personal experience with a family member or through some of the less flattering news reports of fraud and abuse. Because the



SNF is the most commonly understood and referenced element of LTC, I will often refer to it throughout the rest of this article to illustrate the impact of managed care.

## Literature Review

A literature search on the topic of case management, a hallmark of the managed care industry, mined one very telling article by Detmer and Boyle detailing a continuum of care network established by Group Health Cooperative of Puget Sound (GHGPS) that employs nurse case managers.<sup>3</sup> The article details many of the principles found in other models for health maintenance organizations (HMOs) delivering LTC. The organization offers a full continuum of care and all enrollees are assigned a nurse consultant. The nurse sees 30% of the panel regularly and is the person they call for medical advice. She attempts to empower the patient through information and allowing them to share in decision-making options. Interestingly, Meisenheimer discusses these same ideas from a quality assurance perspective.<sup>4</sup>

A key component of quality care is communication. Many of the savings in resources by the GHGPS model are generated by effective communication practices. This seems relatively simple, but communication is often the key component lacking in care in this day of increased specialization. In GHGPS, the ambulatory nurse shares case notes and care plans with the inpatient nurse when panel members are hospitalized. The patient is then followed into the home care phase of treatment after discharge or GHGPS also offers a SNF for rehabilitative needs if required. The model focuses on personal attention by nurse case managers and the continuity of care. This approach results in a cost savings and perceived quality by the patient.

Patients sometimes wonder if the managed care approach allows for the same quality of care as fee-for-service (FFS). Holtzman et al addressed this issue as they attempted to disprove the notion that Medicare HMO patients have poorer outcomes with formal home-health care than do FFS patients.<sup>5</sup> Their study covered the time period from Feb 88 to Mar 89 and included 211 patients from 19 acute general hospitals in the Minneapolis/St Paul, MN, area. They report the results of the study indicated no statistical difference in outcomes between HMO and FFS patients discharged to home-health care after an acute

hospital stay. One significant finding of the study, though, revealed that HMO patients generally had shorter stays in the hospital and were more likely to be discharged to a nursing home.

Von Sternberg et al took the issue one step further as they described Transitional Care Centers (TCC) as an innovative subacute care program with the purpose of promoting continuity of care for frail, older plan members.<sup>6</sup> Their retrospective 1-year study looked at 1144 patients in five nursing facilities in Minnesota. The study resulted in a finding that “post-acute length of stay in the TCC was substantially lower than that in customary care settings in contract nursing homes.”<sup>6, p87</sup> Generally, the difference in length of stay was approximately 6 days. Additionally, the re-hospitalization rate for this population was as good or better than those from other subacute units.

## Case Management

Ostensibly managed care professes to save organizations and beneficiaries money by “reorganizing the health care delivery system in ways that make care more efficient and effective.”<sup>7, p87</sup> Managed care offers case management and the report by Detmer and Boyle clearly demonstrated the positive effects of such a concept.<sup>3</sup> At this point, however, it is relevant to enumerate the specific goals of case management. Case managers (1) individualize assessment of need; (2) maximize the integration of health and social services; (3) ensure the appropriateness of care; and (4) follow up to assess the results and reassess needs.<sup>8</sup>

Many people will say that one element is missing from the list above – cost containment. Cost is definitely a critical component, but certainly cost savings are the result of effective case management and not the specific goal. If this were not true, then the entire concept would be in question since quality and appropriateness of care are the focus of health care professionals.

To ensure appropriateness of care is the objective and not cost, Texas approved legislation in 1997 allowing consumers to sue HMOs for medical malpractice on the grounds of withholding care for fiscal considerations.<sup>9</sup> To do so is an intentional tort. This move is likely the first in what will become the standard across most of the U.S.

## Financial Concerns

Facilities or programs not filled to capacity can benefit from contracting with a MCO. The same holds true for those entities seeking a more balanced mix of patients.<sup>10</sup> Considering the intent of managed care, a contract with a MCO ensures a steady flow of patients since patients tend to have shorter stays, thus allowing for greater turnover of available beds and greater revenue.

How much money is out there? In 1997, total long-term expenditures exceeded \$100 billion annually and of that, Medicaid paid approximately 44% while Medicare accounted for 16%. In fact, the fastest growing element of the Medicare budget is home-health care.<sup>11</sup> These numbers clearly indicate that an opportunity to make a profit exists.

With all government programs, reimbursement is usually slow. It is not uncommon for third party (Medicare/Medicaid) receivables to stretch beyond 75 days.<sup>12</sup> Under managed care though, the general rule is that receivables do not exceed 45 days. Since a contract details the type and amount of payment, facilities often know in advance what they will receive for each patient. This does not imply that a facility does not need a sharp financial officer, in fact, "budget awareness must be part of management's day-to-day operations."<sup>12, p 16</sup>

## Managed Care Requirements

At this point, it is fairly apparent that managed care is probably a good idea for many organizations. Assuming an organization decides to pursue a managed care contract, there are a number of areas in which they must first prepare. According to Fischer, organizations should secure accreditation, have proven programs, have a resource tracking system in place, conduct satisfaction surveys, pursue continuous quality improvement, possess clinical guidelines, measure outcomes, provide service enhancements, and must be Medicare certified.<sup>13</sup>

Managed care plans require certification, but they also are looking for a continuum of care. Items they look for include piped-in oxygen, sufficient therapy space, relationships between the individual therapists and the facility, and a full range of therapies offered – physical, occupational, and speech.<sup>13</sup>

Many health plans rely on the National Committee

for Quality Assurance (NCQA) accreditation as a symbol of quality. Understandably, these same MCOs expect any of the LTC organizations they contract with to do the same.<sup>13</sup> If an organization were serious about playing in the managed care arena, they would gain a lot by seeking accreditation from the JCAHO as well. The JCAHO has a long history and is recognized as the front-runner in ensuring quality in health care organizations.

Utilization management is a cornerstone of managed care, so it stands to reason that a MCO will be very interested in an organization's ability to demonstrate how it ensures efficiencies. Lumped into this broad topic are practice guidelines, data management, and outcome measurement. All of these are indicators as to whether or not an organization is effective in providing quality care.

## LTC Posture

Applying the topics discussed so far to a LTC facility is really where we want to go. In Cohn et al conducted the *National Survey of Managed Care and Multi-Level Long-Term Care Facilities*.<sup>14</sup> This survey assessed all the elements described by Fischer and determined to what extent LTC, as an industry, was prepared to participate in the managed care arena.<sup>13</sup>

So, how ready is LTC for managed care? Of the facilities included in the report, just under two-thirds had at least some of their residents receiving care from MCOs; however, this does not indicate interaction between the facility and the MCO. Just less than one-third of the facilities reported direct dealings with MCOs. More telling is that while 70% of those not involved with MCOs rated themselves prepared to enter an agreement, not one of the remaining 30% indicated that they would resist entering into some type of contract with an MCO. This demonstrates willingness and a certain level of motivation, but what did those actively participating find lacking in their organization regarding the needs and wants of their managed care partners?

Facilities indicated the primary areas of concern were case management, information systems to collect data related to patient outcomes, and practice guidelines or clinical pathways. These three elements existed in a small number of facilities, but overall, these were the three areas identified as needing the most attention.<sup>14</sup> Additional

comments from the study indicated a need for more sophisticated management information systems to better track costs and assist in pricing services. Costing services is a critical element of entering into a managed care contract. If an organization cannot accurately price out their services, they stand to go bankrupt.

For those organizations participating in managed care contracts, the motivators for entering into agreements with MCOs were external marketing factors and the establishment of state Medicaid programs requiring MCO membership.<sup>14</sup> It is interesting that the financial risk required by the MCO, generally one of the most talked about issues regarding managed care, was rated third with less than 10% addressing the issue. The study made one thing perfectly clear: LTC facilities believe they must play in the managed care game, but are not necessarily prepared.

### **Social HMOs**

Specifically addressing HMOs, currently they do not, as a rule, include LTC services. For this reason, demonstrations are now underway for social HMOs (SHMO). These programs add community care services and short-term nursing home care to a Medicare HMO's basic service program. "The purpose of the SHMO is to administratively combine acute, LTC, and behavioral/social health services into an integrated health service delivery."<sup>11</sup> The program heavily emphasizes geriatric services with a case management approach. Current literature indicates a growing interest in this new form of HMO for the aging American population. The demonstration will carry over into the new millennium and if current trends continue, speculation is that the SHMO will be a permanent Medicare benefit.<sup>11</sup>

### **Impacts of Managed Care**

Who benefits from managed LTC and why? All concerned parties (patient, organization, and payer) benefit from properly managed MCO contracts. In fact, acute care services provided in LTC settings can often be delivered more efficiently and more effectively. The continuum of care is linked together and the case managers either follow the patients through the system or hand off the patient file or care program with detailed coordination. One element requiring recognition is that to build these great linkages,

facilities need to invest in more administrative staff to facilitate the flow of information.

The LTC industry is recognizing another key issue: to compete for managed care contracts, many separate facilities need to band together creating the continuum of care desired by MCOs. This is possibly the greatest impact that managed care has had on LTC. The MCO want to deal with a single entity, standard in operations across the service spectrum, and geographically dispersed. The trouble with this issue is that the numerous members of the alliances cannot agree on everything.<sup>15</sup> What they can agree on though, is that provider networks can use shared data to improve patient outcomes and keep costs down, thereby creating an advantage over independent facilities.<sup>16</sup>

Groups containing nursing homes must face the issue of hospitals moonlighting in post-acute care. Prior to the onset of managed care, hospitals would routinely refer older patients needing minimal care to nursing facilities. Today, nursing homes see many of their previous referring relationships dissolving as hospitals scramble to find more patients to fill their beds. The first step in wresting control from the hospitals is for these alliances to come together and use "group purchasing contracts, to share information such as outcomes measures, and to eliminate waste and duplication in the pharmacy, lab, and other departments."<sup>15</sup> Going one step farther, it is not uncommon to find competing nursing facilities entering partnerships. One may contract with another for the overflow it is required to care for under a managed care contract. Things are not like they once were, even just a few years ago.

The litmus test for managed care is "what do consumers think of the product?" The jury is still out on middle America, but most retirees are happy with HMO plans. Nearly 70% of one surveyed population stated they were extremely happy or very satisfied with their Medicare managed care plan. A follow on to this is that 61% of the same population stated they liked their current Medicare managed care plan better than the traditional Medicare plan.<sup>17, p 46</sup>

In the American health care system, managed care's penetration is not great statistically; however, it is on the increase. In the late 1980s, a few LTC providers gambled on gearing up subacute units so they could negotiate contracts with managed care companies. Their successes

prompted others to follow and expand upon the idea. By early 1998, 6 million Medicare beneficiaries – 14% of the total – had enrolled in Medicare HMOs. In 1996, managed care accounted for 1% of nursing facility revenues. In 1997, that figure jumped to 7%.<sup>18</sup> This trend continues and is obviously going to impact federal budgets for years to come.

## **Industry Perspective**

To get an industry perspective on how managed care impacts the delivery of LTC, I sat down with two people from Vencor in San Antonio, TX. Over the course of two sessions, we discussed what they perceive as important in maintaining their managed care contracts, the patient mix of the facility, the impact of quality controls, how prospective payment impacts care, and certification.

Before getting into the details of the conversations, I want to specify the types of services they provide and their patient mix. The facility operates an ambulatory Alzheimer program, a 5-day respite care program, a sub-acute care unit, a rehabilitative unit, and a unit that contains all levels of care. Their patient mix contains Medicare/Medicaid, managed care, and private pay patients. They have capacity for 30 Medicaid, 16 Alzheimer (prospective payment system [PPS]), 20 MCO, and 45 Medicare patients. At the time of interview, they had 105 patients in residence.

According to one of the employees (wishing to remain anonymous), in order to compete for a managed care contract with Humana, the facility had to offer Medicare certified beds; provide speech, respiratory, occupational, and physical therapies; practice pathway management; and submit to the contractors decision on what care is covered. Other critical components needed to compete include certification and being able to track resources in an effort to accurately cost out specific diagnostic related groups. After obtaining the contract, some interesting dynamics take place.

The same employee noted that external case managers are never argued with because of their ability to influence families regarding where they refer patients (written communication, October 14, 1998). The point here is that case managers influence families and physicians greatly. Conversation with E. Schwartz

(October 1998) noted though that case management on the part of the MCO was a positive element. In fact, managed care patients are more closely managed regarding therapy usage levels than Medicare patients. This inherently is due to a person being on site versus having to fax a request to Austin, TX, for approval.

The direct impact of managed care in this facility is shorter stays, no decrease or change in quality, closer monitoring of the patient's care, a patient advocate (case manager), and a personal touch. Conversation with Schwartz (October 1998) added that managed care creates jobs that historically were not in great demand – case managers.

One drawback to the MCO noted by Schwartz (written communication, October 1998) was that certain HMOs would not allow some of the same drugs covered by other HMOs or Medicare. She was not specific, but noted that the level of care was not significantly diminished. Also associated with pharmaceuticals, Schwartz stated that the outpatient pharmacy benefit available to MCO plan members is nonexistent for Medicare outpatients. This seemed to be an important selling point as far as Schwartz was concerned.

Both employees of Vencor agreed that the quality controls required by the contractor held providing organizations accountable and were positive in nature. Under capitated PPS, managed care again requires the organization to scrutinize the delivery of services and be able to precisely cost-out services. One of Vencor's quality efforts for this particular facility includes certification of the pharmacy through JCAHO. The rest of the facility will go through the JCAHO inspection the following year. One thing apparently not conducted by this facility is a patient satisfaction survey. This is interesting considering the size of Vencor and its overall success.

## **Initiatives**

The LTC industry should adopt measures to police the industry and promote quality through developing quality improvement standards and teams to implement quality programs. Quality teams should incorporate members from the staff at all levels, residents, family members, local service providers, and state consulting agents. The other sides of this proposal is that consumers



must become better informed and carefully select providers and organizations known for their high quality product. To make this possible, consumers need comparative information. One example of the type of information that would assist potential consumers is licensing status. By requiring licensing standards, many of the nonperformers could be weeded out before problems arise. Through the NCQA, facilities could seek and receive accreditation (another symbol of quality) and make their performance known through the Health Plan Data Information Set.

## Challenges

A couple of the more prominent challenges facing LTC in the near future are implementing self-imposed quality controls in the assisted living communities (ALC), and evaluating the efficacy of requiring the military health system (MHS) to provide LTC to military retirees eligible for Medicare benefits. These are both critical initiatives for the beneficiaries using the services.

Quality is always important, but currently, the assisted living industry does not have mandatory controls in place. Recently, news reports have detailed the fiscal irresponsibility and false claims of ALC management. Many older people have lost their entire lifesavings to some of these organizations and have been forced to move from their residences into a Medicaid funded nursing home. The key players in the ALC industry recognize the problems and are considering policing themselves before the government intervenes.

The government already plays a big part in the MHS, but currently Medicare Subvention is analyzing the feasibility of the military providing care to retirees who are also Medicare eligible. If Congress determines that they want to pursue this type of relationship, a serious issue facing the MHS is how to fund the elements of LTC that Medicare currently offers as a benefit. Specifically, home health will be a large cost center. Beyond requiring facilities to provide numerous pieces of medical equipment for the patient to use in the home, tri-care contracts will require renegotiations to provide LTC services under the Medicare umbrella. This in itself will be extremely costly. Remember that military retirees are generally a healthier population and tend to live longer than the average American. As health care evolves and

people live even longer, this is going to be a very expensive proposition. Studies must begin to demonstrate the predicted costs associated with the proposal.

## Conclusion

A FFS environment includes few incentives for providers to operate efficiently. Because LTC can be costly, managed care is a perfect fit. Case management is a further complimentary measure. Individual or team case managers potentially create a more personal relationship between the provider/payer and the enrollee while assuring that only the necessary and appropriate care is delivered. Numerous LTC facilities recognize the need for affiliating with a MCO but are finding out that they are not prepared. The impacts of managed care on LTC are significant. In order to meet the requirements for contracting with the MCOs, LTC organizations are developing information systems to manage financial and clinical outcome data, developing and implementing clinical pathways, and seeking certification and accreditation from national organizations. Additionally, the quality requirements mandated for contracting with MCOs assist in policing the areas of LTC that have been subject to fraud. Managed care benefits the payer, the patient, and the providing organization while still allowing for the provision of good quality care. This is achieved by promoting efficient use of resources and providing a patient advocate. The challenge for the future is to determine to what extent the government is going to fund LTC both in Medicare benefits and through the MHS. Americans are living longer and are requiring more medical resources. Government programs may not ultimately be capable of funding LTC at the current level, so the obvious conclusion is for many people to elevate planning for LTC on their priority lists. The bottom line to managed care's impact on LTC is that it ensures that care is documented and measured, therefore assisting in the delivery of quality care.

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## References

1. Kane R. *Long-Term Care: Principles, Programs, and Policies*. New York: Springer Publishing Company; 1987.
2. Sultz H, Young K. *Health Care USA: Understanding its Organization and Delivery*. Gaithersburg, MA: Aspen Publishers, Inc; 1997.
3. Detmer S, Boyle C. *Models for LTC*. Health Maintenance Organizations. NLN: Publications; 1987;20(2188):1-6.

4. Meisenheimer C. *Improving Quality*. 2nd ed. Gaithersburg, MD: Aspen Publishers, Inc; 1997.
  5. Holtzman J, Chen Q, Kane R. The effect of HMO status on the outcomes of home-care after hospitalization in a Medicare population. *J Am Geriatr Soc*. 1998;46(5):629-634.
  6. Von Sternberg T, et al. Post-hospital subacute care: an example of a managed care model. *J Am Geriatr Soc*. 1997;45(1):87-91.
  7. Weiner J, Stevenson D. State policy on LTC for the elderly. *Health Affairs*. 1998;17(3):81-98.
  8. Shapiro E. Case management in LTC: exploring its status, trends, and issues. *J Case Manage*. 1995;4(2):43-47.
  9. Managed Care Protections Crumble Under New Legislation. McKnight's LTC News. September 1997; p 38.
  10. Gottlieb S. New rules for the LTC money game. *Nursing Homes LTC Manage*. 1997;46(5):21-25.
  11. Cohen M. Emerging trends in the finance and delivery of LTC: public and private opportunities and challenges. *The Gerontologist*. 1998;38(1):80-89.
  12. Cotton T. Financial Management: the changes ahead. *Nur Homes LTC Manage*. 1997;46(5):16-20.
  13. Fischer E. How to Make Sure You're in Their Plans. *Contemporary LTC*. 1998;21(3):28-30.
  14. The Anna and Harry Borun Center for Gerontological Research/UCLA/JHA and Scan Health Plan. (September 1997). In: Cohn J, ed. *Final Report: National Survey of Managed Care and Multi-Level LTC Facilities*. Reseda, CA; 1996.
  15. Snow C. Rivals ally to net managed care pacts. *Modern Healthcare*. 1996;26(32): 108-110.
  16. Managed Care to Shape LTC's Future: Report. *McKinigh's LTC News*. October 1997; p 33.
  17. Most Retirees Happy with HMO Plans. *McKnight's LTC News*. September 1997;p 46.
  18. Bonifazi W. Who pays for LTC? *Contemporary LTC*. 1998;21(10):76-82.
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# Psychological Intervention for 9/11 Military Mental Health Responders

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## Introduction

*Problem Overview.* An abundance of literature addressing the issue of secondary stress as a form of psychological distress has been researched in recent years.<sup>1</sup> However, only a small part of this growing research represents empirical investigations of secondary traumatic stress (STS) and its implications.<sup>1</sup> Among the adverse mental health consequences of catastrophic traumatic events is the risk related to the development of post-traumatic stress disorder (PTSD) in the responder population. Other risk factors for PTSD, including patient trauma exposure and patient PTSD, can also contribute to the experience of secondary trauma.<sup>2,3</sup>

*The Problem.* In the wake of the September 11th terrorist attack on the Pentagon and World Trade Center (WTC), this investigation seeks to examine the associations of *secondary stress* in the form of psychological distress in military mental health responders involved in combat and operational stress prevention activities after critical incidents. The STS can be defined as, “the natural, consequent behaviors and emotions resulting from knowledge about the traumatizing event experienced by a significant other.”<sup>4, p10</sup> A growing body of literature reports on the risk factors, reactions, and prevention of harm to professionals from exposure to another’s traumatic material.<sup>5</sup> The majority of this literature is conceptual in nature, or reports only anecdotal evidence of the phenomenon.<sup>6</sup> To date, only one pilot study has been done with instruments sensitive enough to capture secondary stress in specifically mental health providers.<sup>7</sup> In the past, instruments that collected data for the purpose of observing the phenomenon of secondary stress were done with instruments designed to look at PTSD or primary acute trauma.<sup>7</sup>

This article considers the *specific outcome* of *secondary stress* in relation to factors associated with

traumatic exposure – namely, responder STS and responder psychological distress. There is evidence linking trauma exposure in patients to increased prevalence of PTSD-like symptoms in responders following exposure to trauma via their patients.<sup>8</sup> Paramount to this study is the population being examined. The responder population, more specifically the mental health responder population, represents one of the most understudied, yet perhaps affected groups associated with traumatic events. These previously forgotten people have not received adequate exploration within the field of traumatology. This will be the first study of its kind to measure a difficult to reach sub-group of this forgotten population – military mental health responders.

Pertinent to *military mental health*, understanding the military-induced soldier and family stressors brought about from combat and operational stress control operations is critical to the development of the social work officer’s role in developing combat and critical event stress prevention programs, treatment services, and family support programs.<sup>9</sup> In general, *social work research and practice* will benefit from the findings of this study because the diversity and severity of potential consequences is alarming. These consequences serve to highlight some major social problems such as child maltreatment, suicide, and other violent deaths among responders and alcoholism and its related problems responders.<sup>8,10,11</sup> Since providing intervention to traumatized clients is an integral function of social workers, they are at potentially the same risk as other responder populations for these alarming problems. One of the implications for this study is to begin to address how to take care of the caregivers. This will be followed by an examination of some of the problems and syndromes often hidden by the responder community. These problems are part of the STS syndrome this investigation intends to define and suggest interventions for.

## Disaster

The idea of disaster dates to 3,000 years before the Common Era. Cities such as Ur, Jericho, and other ancient city-states were located in an area of ecological and social instability. However, the relationship between communities and disaster is not simply a historical or archeological interest. Since these early enclaves, communities have been faced with the same problems as the personnel at the Pentagon on September 11th, that of disaster response.

There is no model disaster and no model terrorist response. Interventions and outcomes can be war-gamed and responses to disaster rehearsed for different contingencies; however, these exercises will only serve as templates for action and response. Contingency planning efforts give responder organizations and communities guidelines or structures within which their behavior can be directed toward some expected outcome such as restoration of functioning of community infrastructures.<sup>12</sup> These guidelines are analogous to coloring books. Because there is no model disaster, each event has its own unique characteristics. Therefore, responders must color in the pictures between the lines differently for each contingency. The contingencies the military most typically responds are weather, war, and terrorism. This investigation will look at the terrorist attack on the Pentagon.

### **Terrorism - "Kill one person, frighten 10,000"** *(Chinese proverb)*

After the harrowing events of 11 Sep 01, the world is a very different place in many respects. Unfortunately, because of the focus of terrorism, to make the general population feel unsafe and thereby bring attention to their cause, fighting this nemesis requires efforts on many fronts. However, terrorism is not a new phenomenon. Here is a terse look at some of the major terrorist events in history. As early as 66 AD, terrorist acts have been recorded beginning with the Zealots that fought against their Roman occupiers. Shiite Muslims fought against Christendom during the Crusades from 1090 to 1275 and coined the terms "assassins." These early acts were born out of resistance to occupation.<sup>13</sup>

The word "terrorism" was first used in 1795, a grim

result of the heady period that brought the American War of Independence and the French Revolution. The word was born with the Reign of Terror, the use of the guillotine by the French revolutionaries to consolidate their regime by killing their enemies and intimidating the potential opposition.<sup>14</sup> The U.S. State Department defines terrorism as, "The unlawful act of force or violence against individuals or property to coerce or intimidate governments or societies to achieve political, religious, or ideological objectives."<sup>13</sup>

With the end of the 6-Day War in 1967, the end to waging conventional warfare with Israel, began a new era in terrorist activity with ripple effects still felt today. Groups such as the Palestine Liberation Organization, Hezbollah, and Al Qaeda have been targeting U.S. and western interests since then beginning with the first "Air Terrorism" in 1968 and the Munich Olympics in 1972. By the 1980's, a series of embassy attacks, bombings, and kidnappings impacted U.S. military personnel from Beirut to West Germany. By 1990, the U.S. became concerned about a shift in terrorist activity from attention-seeking incidents to Weapons of Mass Destruction (WMD) events such as with the Sarin Gas Bombing in a Tokyo subway. There is an accumulating psychological impact from recent experiences with WMD. This sense of psychological vulnerability began with the first WTC bombing (1993), the Oklahoma City Bombing (1995), the Khobar Towers (1996), the U.S. Embassy bombings (1998), the USS Cole (2000), and culminated with the September 11th attack on the WTC (2001).

## Responders

### *Literature Review.*

Until recently, it was thought that trauma workers, because of their special training, were immune to traumatic stress reactions and symptoms, but as early as World War II there was evidence to the contrary that this was a myth. Vedder noted the impact of secondary stress in physicians at Iwo Jima in his comments about doctors in distress.<sup>15</sup> However, observations like Vedder's went largely ignored. In 1978, Figley suggested that family, friends, and professionals are susceptible to developing traumatic stress symptoms from being empathetically involved with victims of traumatic events.<sup>16</sup> Since then, several authors have argued that traumatic stress symptoms are contagious and can produce similar effects

in those who work with trauma victims.<sup>17-36</sup> Literature from responder agencies suggests as many as 100% of the police, emergency medical service, and firefighters would be listed as “disabled” – meeting the criteria for lifetime PTSD.<sup>37</sup> It is now hypothesized that as many as 35% of emergency responders actually meet criteria for PTSD.<sup>38</sup> Two studies appear to confirm this hypothesis. In one involving social work responders, 37% of Child Protective Service Workers were found to have symptoms of STS.<sup>39</sup> A second study of police involved with the Sun Valley aircraft accident (plane hitting shopping mall) found that 37% of police responders met PTSD criteria, 46% after 6 months, 35.9% after 12 months, and 46% after 18 months.<sup>40</sup>

Research in the area of secondary trauma has produced several generalizations about the effect of working with the traumatized person. First, professionals who work with traumatized persons can exhibit the same range of symptoms as victims. Second, the longevity and severity of these symptoms will vary with the individual. Third, professionals working with trauma victims are more likely to exhibit symptoms if they have been personally traumatized than if they had not that experience. This section summarizes the studies that have examined these three areas.

First, researchers have found that professionals exposed to traumatic material experience the same array of traumatic stress symptoms as those reported by victims of traumatic events.<sup>17,19,20,22,25,28,31,41,42</sup> Disturbed sleep, anger, fear, suppression of emotions, nightmares, flashbacks, irritability, anxiety, alienation, feelings of insanity, loss of control, and suicidal thoughts have been experienced by crisis workers and therapists flowing exposure to trauma victims.

Second, a number of researchers have reported that similar to primary victims, the longevity and severity of symptoms professionals experience varies from person to person. In particular, researchers have found a positive correlation between longevity of career, large caseloads, increased contact with clients, and long work hours and the longevity and severity of STS symptoms.<sup>17,19,25,26,43-51</sup> For example, in her study of distress among therapists who were indirectly exposed to trauma, Chrestman reported a relationship between increased professional experience, the number of clients in the therapists’ caseloads, and

increased STS symptoms.<sup>44</sup> She also reported a relationship between higher percentages of time spent at work and an increase in avoidance symptoms in therapists. Similarly, in Hodgkinson and Shepard’s study of British social workers who provided support to primary victims of the Piper Alpha North Sea Oil Platform explosion, the authors found a significant relationship between the number of years on the job and Symptomatology.<sup>25</sup> In their study of police officers, firefighters, paramedics, emergency medical technicians (EMTs) and California highway department workers who responded to the Loma Prieta earthquake, Marmar et al found working long shifts with few breaks and harsh climactic conditions were associated with greater depersonalization, memory disturbances, altered body image experiences, and altered time sense in workers.<sup>47</sup>

Third, factors other than exposure have also been found to have an impact on the severity of STS symptoms in workers. Researchers have determined that workers who have experienced a personal trauma are more likely to suffer from severe STS symptoms than workers who did not have a personal trauma history.<sup>29,45,47,49,52,53</sup> Moran and Britton surveyed 210 Australian State Emergency Service and Volunteer Bushfire Brigade Unit workers.<sup>49</sup> The authors reported that workers who had had a personal trauma history experienced higher levels of STS symptoms after responding to disaster than those without history. Kassam-Adams reported a relationship between therapists’ personal trauma history and severity of STS symptoms while Follette et al determined both mental health and law enforcement professionals with personal trauma histories had significantly higher levels of trauma-specific symptoms than professionals not reporting prior traumas.<sup>45,52</sup>

Studies concerning secondary exposure to traumatic material have focused primarily on the traumatization of traditional emergency responders (paramedics, firefighters, EMTs, police officers, and rescue workers). Military mental health SPRINT Teams, Combat Stress Control Teams, and Family Support Center Personnel are just as likely as crisis responders to be directly exposed to a number of operational or natural critical events on a daily basis or throughout their careers. While responding to the September 11th attack on the Pentagon, military mental health responders learned graphic details of the catastrophic events that shook not only their patients, but



their nation, their neighbors, and coworkers as well. These responders were placed at ground zero of an event in a compromising situation that exposed them to physical harm or emotional harm, thus increasing exposure to possibly traumatic stressors.

### *Military Responders.*

For military mental health responders, disaster mental health has distinctive features that make it stressful. These features are related to the work itself, the unique role of the mental health professional, the transmission of vicarious or secondary stress from victim to responder and the fact that the responder is also a member of the organization often in which the crisis takes place.

The military combat stress control community emphasizes intervention using the principle of Proximity, Immediacy, Expectancy, and Simplicity. After a disaster such as the Pentagon attack, there is the urgency and immediacy of the response. The disaster response is usually one of outreach, in which the combat stress teams have little control over many aspects of the situation – when it happens, what the environment will be like, who will be affected, and what specific functions will be necessary to gain command and control of the response. Often there is little notice of sudden critical events, no time for preparation, and a limited amount of time for individual interventions. Despite the protocols set forth in FM 8-51, *Combat Stress Control in a Theater of Operations*, in the wake of the traumatic event, the mass volume of the work, both in terms of number of casualties requiring attention in any one scenario and in terms of successive traumatizing information coupled with the fact that the responders may be victims of the disaster themselves, can have a debilitating effect.<sup>54</sup> In addition, the intensity of the emotions present, the overall military response is typically high, the victims are often regressed, and a large amount of energy on the part of the military mental health responder is exerted to contain them.

Secondary stress effects are of particular significance in crisis intervention because they are insidious in nature. It is difficult to imagine that a person who has not been exposed to the traumatic events themselves may exhibit the features of an acute stress reaction or PTSD, yet subjectively, it seems many responders do indeed present as if they themselves had been traumatized after repeated disaster and operational interventions.

The stresses of the military environment are distinctive and significant. There is always the threat of deployment and combat, long and arduous training missions, and separations from families.<sup>55,56</sup> As stressful as combat may be, a growing amount of literature suggests that military operations other than war and military domestic responses to disaster and terrorist activities may have as deep an impact on a soldier as combat. Particularly since the terrorist attacks on the U.S. in mid-September of 2001, a significant portion of the U.S. population are directly impacted by exposure to traumatic events. These kinds of events are highlighted, but not limited to the attack on September 11th. Traumatic exposures can include child sexual and physical abuse, sexual and physical assault in adulthood, violent crime, natural and vehicular disasters and sudden, unexpected death. Several epidemiological studies have been conducted since 1995 and they estimate a lifetime prevalence of exposure to traumatic events with a range from 40% to 81% – meaning that a large portion of the general population may suffer from the deleterious effects of traumatic events.<sup>57-59</sup> In the period between 1967 and 1991, averages of 17,000,000 people living in developing countries and 700,000 in developed countries were affected by disasters each year.<sup>60</sup>

A number of PTSD articles concern themselves with the unique psychological aspects of peacetime military duties.<sup>61-65</sup> Moreover, there has been a proliferation of articles in the last 5 years on childhood and familial risk for PTSD suggesting that anyone repeatedly exposed to persons with PTSD symptoms may develop those symptoms. There is also vast literature that looks at the adverse mental health consequences of childhood trauma and the risk related to the development of PTSD in adulthood. For example, 25% of Bosnian youth who witnessed combat and were later relocated to the U.S. had PTSD.<sup>66</sup>

Four databases, Galileo, Biomednet, Psychoinfo, and PILOTS were systematically searched using the following keywords: secondary trauma, STS, multigenerational trauma, and psychotraumatology.<sup>1,67-70</sup> The search results yielded nearly 125 journal articles, books, and doctoral dissertation abstracts. The PILOTS catalogue further yielded over 16,000 articles on PTSD alone. To date, both retrospective and prospective studies have demonstrated that individuals exposed to childhood trauma, specifically, physical abuse and neglect and sexual abuse, are more likely to show symptoms of PTSD than adults who do

not.<sup>3</sup> The impact of vicarious stress can be seen in other populations associated with trauma. These earlier works include studies of abused children and spouses, and studies of populations of family members associated as secondary trauma victims with relationships to combat veterans, holocaust survivors, firefighters, emergency service responders, and law enforcement officials.<sup>37,71-74</sup> The literature on these groups suggested the existence of an STS practice theory and the evidence for a secondary traumatization process from which a research hypothesis pertaining to responders could be developed.<sup>1</sup> Both the theory and process are integrated positions that were built on multiple factors and pathways analogous to PTSD, a diagnosis built on factors and pathways of other disorders.

### Normal Response Syndromes

Between 1984-1994 there were 284 Presidentially declared disasters and eight National Emergencies within the U.S. Federal Emergency Management provided funding to 553,835 people during this same period.<sup>75</sup> Meichenbaum estimated there are about 17 million people in North America alone who are exposed to trauma and disaster each year.<sup>76</sup> Of those exposed, a significant number will develop chronic PTSD.<sup>77</sup> The PTSD is but one normal reaction to an abnormal event. The table details these other normal response syndromes. One study of police summarizes the findings both in the military and civilian responder communities despite the number and type of incidents that these responders have become familiar with. Following a police shooting, the impact on

the rest of the force indicated that 80% of officers noted some levels of emotional distress and increases in chronic manifestations of stress such as relationship problems, gastrointestinal problems, and substance abuse.<sup>19,78</sup> Unfortunately, it might indeed be the growing familiarity with critical events and disasters that have a cumulative effect on the responder.

### Drugs, Alcohol, and Counseling Needed for Responders

*Civilian Responders.* The Oklahoma Gazette, 19 Jan 99, indicated some alarming effects among the Oklahoma City bombing rescuers. Increased alcohol use, increased retirements and/or resignations, increased domestic violence and a significant increase in post-traumatic Symptomatology have been documented. These individuals are entering the 3 to 5 year window, post trauma, which seems to be a critical period for rescue workers in incidents of this magnitude.<sup>79</sup> Among those involved in the rescue and prosecution process, there have been 30 successful suicide interventions of local firefighters and their families. There were approximately 12,000 bombing rescue workers and over 66% of them reported handling body parts. Of the 50 rescue dog handlers who participated in the recovery process, seven of the first 10 who responded to the site of the bombing have since left the search and rescue service. In addition to rescue workers, others who have been caught in the endless ripple effects, FBI investigators to reporters, have needed counseling. Some 9,600 people in the Project

Physical Signs	Mental and Emotional Signs
<ul style="list-style-type: none"> <li>- Tension: aches, pains, tremble, fidget, fumble things</li> <li>- Jumpiness: startle at sudden sounds or movement</li> <li>- Cold sweat; dry mouth; pale skin; eyes hard or focus</li> <li>- Pounding heart: may feel dizzy or light-headed</li> <li>- Feel out of breath too much until fingers and toes start to tingle, cramp, and go numb</li> <li>- Upset stomach; vomiting</li> <li>- Diarrhea or constipation; frequent urination</li> <li>- Fatigue: feeling tired or drained; takes an effort to move</li> <li>- Distant or withdrawn</li> </ul>	<ul style="list-style-type: none"> <li>- Anxiety: keyed up, worrying, expecting the worst</li> <li>- Irritability: swearing, complaining, easily bothered</li> <li>- Loss of concentration; difficulty paying attention, remembering things</li> <li>- Difficulty communicating, thinking and speaking</li> <li>- Insomnia; trouble getting to sleep, awakened by intrusive dreams</li> <li>- Grief: tearful, crying for injured and dead</li> <li>- Feeling badly about mistakes or interventions taken</li> <li>- Anger: feeling let down by leaders, others, or frustrated by limits of what could be done</li> <li>- Loss of confidence in self and other</li> </ul>

Table. Stress Symptoms in Responders: Similarities to Battle Fatigue Casualties<sup>56</sup>

Heartland Center have been counseled for the Oklahoma City bombing since 1995.

*Military Interventions.* Peacekeeping and disaster response frequently expose soldiers to dangerous, provoking, or even humiliating situations. These troops have limited possibilities to express resulting anger, confusion, trauma, and frustrations. Self-medication with alcohol and drugs is often the only solution to calm down, lessen the effects of acute stress reactions, and continue the mission and cope simultaneously. In one study with nearly 900 UN peacekeeping veterans, 43.5% of the soldiers indicated they increased their alcohol or drug consumption.<sup>11</sup> However, these same soldiers were unaware of the symptoms they exhibited. Only a small minority gave reasons such as tension, restlessness, anxiety, and stress to explain the increase. The only exception to this was soldiers who experienced a pathological level of symptoms, reaching clinically significant levels of distress. These markedly distressed veterans cited trauma as the reason for increased alcohol consumption. In the end, Mehlum found that UN peacekeepers exhibited a 96%-115% increase in alcohol consumption after tours of dangerous duty and 15%-31% reported symptoms associated with PTSD.<sup>11</sup> To prevent the outcomes of increased self medication and combat and operational stress reactions, part of doctrinal prevention activities must focus specialized education and stress inoculation activities for disaster or peacekeeping missions.

## PTSD and STS

*Post Traumatic Stress Disorder.* As mentioned before, the deleterious impact of experiencing catastrophic events has been catalogued for centuries, however, it was not until the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III APA, 1980) that the first formal recognition of a specific syndrome of symptoms etiology was associated with critical incidents. The inclusion of diagnostic criteria in the manual provided a standard of care and a clinical picture for assessment of the impact of trauma. The DSM IV (APA, 1994) now includes four groups of symptom clusters necessary for making the diagnosis of PTSD. Criterion A is exposure to a traumatic event. It is this criteria that precludes responders not exposed to the actual traumatic event that precludes them from getting this diagnosis despite

potentially having clinically equivalent and significant symptoms as a primary trauma casualty. Criterion B is re-experiencing symptoms, for example "flashbacks." Criterion C is avoidance symptoms, such as persistent numbing. Criterion D is symptoms of heightened arousal, such as hyper vigilance.

*Secondary Traumatic Stress-What is it? A Model for Transmission.* The phenomenon of learning about another's traumatic ordeal and, in the process, experiencing traumatic stress is what Figley refers to as STS.<sup>80</sup> The STS is defined as "the natural, consequent behaviors and emotions resulting from knowledge about a traumatizing event experienced by a significant other. It is the stress resulting from helping or wanting to help a traumatized or suffering person."<sup>80,p 10</sup> The pathological response of being exposed to another's traumata is called Secondary Traumatic Stress Disorder (STSD). The STSD is "a syndrome of symptoms nearly identical to PTSD except that exposure to knowledge about a traumatizing event is associated with a set of STSD symptoms."<sup>80,p 8</sup> The STS symptoms, or STSD, can occur when a system of at least two people is formed, one of whom has been traumatized and one of whom wants to help. Therefore, families, friends, mental health professionals, and other responders who work with traumatized people are vulnerable to STSD.

## Theory

According to Figley's STS Theory, persons who work directly with or have direct exposure to trauma victims on a regular basis are just as likely as the primary victims to experience traumatic stress symptoms and disorders. "People can be traumatized simply by learning about the traumatic event."<sup>80,p 4</sup>

Other authors have studied and written about the effects of caring for trauma victims.<sup>23,27,32,33,81</sup> Pearlman and Saakvitne suggest that therapists who are exposed to "graphic descriptions of violent events, realities of people's cruelty to one another, and trauma related re-enactments" may suffer from vicarious traumatization.<sup>29,p 31</sup> "Vicarious traumatization is a process through which the therapist's inner experience is negatively transformed through empathic engagement with clients' trauma material."<sup>29,p 279</sup> Stamm proposes "care giving can be a stressful experience that may produce a situation ripe for a traumatic stress

response that may or may not lead to a traumatic stress disorder.”<sup>34, p xviii</sup>

Adapted from Danieli’s framework of multi-generational trauma, secondary trauma can be transmitted only after exposure to someone else’s traumatic experience.<sup>1</sup> The responder’s subsequent exposure to vicarious trauma causes a *rupture*, a possible regression, and a state of being “stuck” in this free flow, which is termed *fixity*. The time, duration, extent, and meaning of the trauma for the responder, the survival mechanisms used to adapt to it, and the contexts of the post-victimization traumata will determine the elements and the degree of rupture, the disruption, disorganization, disorientation, and the degree of fixity. The fixity may render the responder vulnerable, particularly to further trauma/ruptures, throughout the developmental life span. This model should be used to determine how to best systematically intervene. For example, the attack on the WTC not only ruptured continuity but also destroyed other existing supports for responders and primary victims alike. Danieli believes one of the issues facing interventions with multi-dimensional traumas is the ensuing conspiracy of silence between survivors and society and the culture of the responder, including military mental health professionals, that deprived them, their families, and their comrades of potential supports.<sup>1</sup>

The model calls for us to look at secondary trauma from a contextual standpoint. This means that the integration of trauma must take place in *all* of life’s relevant dimensions and cannot be accounted for by the individual alone. To fulfill the reparative (individual and national, real and symbolic, unit members and leadership) and preventative goals of psychological recovery from trauma, perspective and integration through awareness and containment must be established so that one’s sense of continuity, belongingness, and rootedness are restored.<sup>82,83</sup> For the U.S. Army Medical Department, this idea is consistent with its function as a force multiplier, returning as many soldiers to duty as possible. Healing and self actualizing can only begin when the integration of traumatic experiences is examined through the totality of the secondary trauma casualty’s, family member’s, and military community’s lives.<sup>1</sup>

### Need for the Study

Although there is a plethora of literature with

anecdotal accounts of emergency responders and rescuers, including military responders, abandoning clinical or prevention activities because of the tremendous personal strain associated with it is unknown to what extent this attrition within the military is due to STS.<sup>7</sup> The experience of STS is hypothesized to be one reason why many human service professionals and emergency service personnel leave their services prematurely.<sup>4</sup> There are other implications and perhaps hidden effects related to these shortened careers. Beaton and Murphy identify short-term emotional and physical disorders, increases in interpersonal violence, increases in substance use and abuse, and lower productivity as costs of not addressing the unofficial but real syndrome of STS in responders.<sup>17</sup> As the first anniversary of the September 11th attacks approaches, victims of secondary stress have been seen mostly by Army family advocacy and drug and alcohol programs. It is our ethical duty as responders charged with force protection in the U.S. Army Medical Department that we prepare our clinicians for participation in and prevention and treatment of this occupational hazard.

In addition to having potentially impaired providers within the serve or loss of them to attrition, Danieli suggests there can be several generations affected by traumatic stress.<sup>1</sup> While Danieli’s model speaks to intergenerational aspects of trauma transmission, it is plausible to hypothesize that providers can also pass this on as tertiary stress to their patients. At a minimum, traumatized clinicians may feel difficulty in performing the task of attending to their duties with patients after a disaster.<sup>7</sup> One of the goals of this investigation is to sensitize the military medical community to the extent of trauma and its contagion. Therefore, to effectively alleviate the negative effects of STS, more empirical research needs to be done. The following is a proposal to begin the process of researching the extent of the problems articulated thus far.

### The Study Proposal

In the proposed study, our goal is to conduct an empirical investigation on the mental health effects of disasters on responders, and overcome past methodological limitations of previous investigations, leading to the development of assessment methods to identify characteristics and factors that predict negative outcome/responses in individual’s post disaster.

## Specific Aims

To explore the mental health effects in responders to disasters at 6 months and 12 months post-event. Military personnel who responded to the Pentagon Attack on 11 Sep 01, will be assessed and consists of males and females aged 18 to 65 who are members of the U.S. Army and U.S. Air Force.

### Primary Specific Aims of this Study

*To examine the mental health effects of the pentagon disaster on responders at 6 months and 12 months post event.* Empirical systematic assessment of these variables will provide a longitudinal assessment of the impact on mental health in the 12 months following the disaster. It is hypothesized that responders will experience increased symptoms on measures of psychopathology including: anxiety, fear, stress/distress, PTSD, substance abuse, and family stress. In addition, responders will have increased physical/somatic complaints as measured on the General Health Questionnaire and assessments of stress and well-being.

*To examine the relationship between individual characteristics of responders and intensity of psychopathology at 6 months and 12 months post disaster.* We will examine responder characteristics including: duties at disaster, number of past disaster experiences, past psychosocial history, family history of PTSD, self-efficacy and the intensity of psychopathology post-disaster. It is hypothesized that responders who have past experiences working disasters, higher self-efficacy, and a negative social history and family history for stress and depressive disorders, will exhibit less psychopathology post disaster compared to responders with less experience, family history of depression, and less self-efficacy.

*To explore the incidence rates and relative risk for developing negative symptoms in responders exposed to disasters.* We will explore group and individual characteristics and their potential relationship to development of increased rates of stress, distress, and PTSD symptoms in responders compared to a group of nonresponders (military personnel who did not work the pentagon disaster). It is hypothesized that responders who worked at the pentagon disaster will have increased incidence rates of negative symptoms compared to the nonresponders.

## Secondary Aim

*To explore the effects on families and relationships of responders who work disasters.* Responders who work disasters return home to their families, and are not properly integrated back into family home life. This dissonance leads to increases in family distress and disruption. It is hypothesized that responders will report increases in family distress and problems with integration to family life post-disaster.

*Potential Selected Primary dependent measures to provide a very comprehensive examination of the problem.*

- PTSD measure – Penn Inventory for PTSD
- Impact of events scale
- SCL-90-R general psychopathology
- Psychosocial history and family history
- Trauma history (crime, disaster, interpersonal) – Trauma History Questionnaire
- Self-efficacy/resilience – Life Experiences Survey
- Depression – Beck Depression Inventory
- Fear/anxiety – Perceived Stress Scale
- General Health Questionnaire – GHQ28
- Drug and Alcohol use questionnaire – I found a “Reasons for Increased Alcohol Use” set of questions from a UN questionnaire
- Family distress – Family Environment Scale
- Self-esteem and levels of social dysfunction – Coopersmith Inventory
- Secondary Traumatic Stress Scale

## Discussion and Conclusion

Several questions could be asked pertaining to an investigation of STS. (1) Are STS symptoms related to exposure to traumatized populations? This investigation will mostly likely limit itself to this first question, as prevalence is the major focus of the proposed pilot study. However, given the number of incidents military mental health professionals are exposed over the course of their career, the next logical question would be (2) Are STS symptoms related to the responder’s own trauma history?<sup>7</sup> Other factors that could be examined empirically are years of military service, years of clinical experience, and the

unique characteristics of the responders personal background.

The primary assumption of this investigation and in the conceptualization of STS is that exposure to combat, operational, and disaster casualties may result in traumatic symptoms and syndromes in the responder. There is literature to substantiate this underpinning. Schauben and Frazier found that 148 psychologists and sexual violence counselors who had a higher caseload of trauma survivors on their caseloads reported more symptoms of trauma, reported more vicarious trauma, and had more cognitive disruptions than those providers without comparable caseloads.<sup>53</sup> Brady et al studied nearly 450 female clinicians and found those with the greatest exposure to cumulative cases of sexual abuse reported the highest trauma symptom picture.<sup>84</sup> Chrestman found that higher caseloads of trauma patients was associated with higher symptoms associated with anxiety disorders, such as higher levels of dissociation. And still another study by Kassam-Adams evaluated occupational stress symptoms and traumatic stress symptoms in relation to clinicians who treated sexual abuse.<sup>6</sup> Nearly 50% of the respondents reported high scores on the Impact of Events Scale which measures some of the symptoms that make up PTSD, such as intrusion and avoidance and that these symptoms persisted 1 year after exposure and over the course of the provider's career.<sup>85</sup> Finally, specifically to military responders, Munroe found that the combined effect of current and cumulative exposure to patients with combat-related PTSD was correlated to the clinicians trauma symptoms.<sup>26</sup>

Combat stress control and emergency response, because of its nature, has the potential to impact responders. The post-traumatic responses of providers are similar to those of the victims themselves in civilian response organizations. There is a need to assess the extent of this problem in the military emergency and mental health responder community.

## References

1. Danieli Y. *International Handbook of Multigenerational Legacies of Trauma*. New York: Plenum Press; 1998.
2. Westerlink J, Giaratano L. The impact of PTSD on partners and children of Australian Vietnam Veterans. *Australian/New Zealand J Psych*. 1999;33(6):841-847.
3. Yehuda R, Halligan S, Grossman R. Childhood trauma and risk for PTSD: relationship to intergenerational effects of trauma, parental PTSD, and cortisol excretion. *Dev Psychopathol*. 2001;13:733-753.
4. Figley CR. Compassion fatigue: toward a new understanding of the costs of caring. In: Stamm BH, ed. *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers, and Educators*. 2d ed. Lutherville, MD: Sidran Press; 1999: p 10.
5. Stamm BH, ed. *Secondary traumatic stress: self-care issues for clinicians, researchers and educators*. 2d ed. Lutherville, MD: Sidran Press; 1999.
6. Kassam-Adams N. The risks of treating sexual trauma: stress and secondary trauma in psychotherapists. In: Stamm BH, ed. *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers, and Educators*. 2d ed. Lutherville, MD: Sidran Press; 1999.
7. Bride B. *Psychometric Properties of the STD Scale*. Unpublished Doctoral Dissertation. The University of Georgia, Athens, GA; 2001.
8. Yehuda R, Schmeidler J, Elkin A, et al. Phenomenology and psychobiology of the intergenerational response to trauma. In: Danieli Y, ed. *International Handbook of Multigenerational Legacies of Trauma*. New York: Plenum Press; 1998: p 639-635.
9. Daley J, ed. *Social Work Practice in the Military*. Binghamton, NY: Haworth Press; 1999.
10. Thoresen S, Mehlum L. *Suicide and Other Violent Death in Former Norwegian Peacekeeper Personnel. The UNIFIL Follow-up Study*. Oslo, Norway: The Norwegian Armed Forces Joint Medical Service, Oslo; 1999.
11. Mehlum L. *Alcohol and Stress in Norwegian UN Peacekeeper*. Paper presented at the International conference on the psychosocial consequences of war, Dubrovnik, Croatia. April 25-30, 1998.
12. Bordick P, Duffy E. Training the urban search and rescue disaster dog: utilization of operant techniques. *Am Animal Trainer Magazine*. April 2002;23-29.
13. Garrison AH. How the world changed: a history of the development of terrorism. Paper presented at the *Delaware Criminal Justice Council Annual Retreat*. October 28-29, 2001.
14. Walker M. *A Brief History of Terrorism. Europe*. Washington DC: United Press International; 2000.
15. Vedder R. *Introduction to Psychiatry*. The Hague: Wolters; 1948.
16. Figley CR. Psychosocial adjustment among Vietnam vets: an overview of the research. In: Figley CR, ed. *Stress Disorders Among Vietnam Veterans: Theory, Research and Treatment*. New York: Bruner/Mazel; 1978:p 57-70.
17. Beaton R, Murphy S. Working with people in crisis: research implications. In: Figley CR, ed. *Compassion Fatigue: Coping with STS Disorder in those who Treat the Traumatized*. New York: Bruner/Mazel; 1995:p 51-81.
18. Danieli Y. The treatment and prevention of long-term effects and intergenerational transmission of victimization: a lesson from Holocaust survivors and their children. In: Figley CR, ed. *Trauma and its Wake: Study and Treatment of PTSD*. New York: Bruner/Mazel; 1985.
19. Dunning C, Silva M. Disaster induced trauma in rescue workers. *Inter J Victimol*. 1980;5.
20. Dyregrov A, Mitchell J. Work with traumatized children: Psychological effect and coping strategies. *J Traumatic Stress*. 1992;5(1):5-17.
21. Eth S, Pynoos R. Developmental perspective on psychic trauma in childhood. In: Figley CR, ed. *Trauma and its Wake: Study and Treatment of PTSD*. New York: Bruner/Mazel; 1985: p 36-52.
22. Gersons B. Patterns of PTSD among police officers following shooting incidents: a two dimensional model and treatment implications. *J Traumatic Stress*. 1989;2(3):247-257.
23. Hartsough D, Myers D. *Disaster Work and Mental Health: Prevention and Control of Stress Among Workers*. Washington DC; NIMH, Center for Mental Health Studies of Emergencies; 1985.
24. Herman J. Father-Daughter Incest. In: Ochberg F, ed. *Post-traumatic therapy and victims of violence*. New York: Bruner/Mazel; 1988:p 175-195.
25. Hodgkinson P, Shepard M. The impact of disaster support work. *J Traumatic Stress*. 1994;7(4):587-600.



26. Munroe J. Therapist Traumatization from Exposure to Clients with Combat Related PTSD: Implications for Administration and Supervision. Northeastern University, Boston MD: Unpublished Doctoral Dissertation; 1990.
27. NiCathy G, Merriam K, Coffman S. Taking it out: a guide to groups for abused women. Seattle: Seal Press; 1984.
28. O'Rear J. Post-traumatic stress disorder: when the rescuer becomes the victim. *J Emerg Med Serv*. 1992;30:30-38.
29. Pearlman L, Saakvitne K. *Trauma and the Therapist: Counselor Transference and Vicarious Traumatization in Psychotherapy with Incest Survivors*. New York: W.W. Norton & Co; 1995.
30. Pynoos R, Nader K. Psychological first aid and treatment approach to exposed to community violence: research implications. *J Traumatic Stress*. 1988;1(4):445-474.
31. Raphael B, Singh B, Bradbury L, Lambert F. Who helps the helper? The effects of disaster on rescue workers. *Omega*. 1984;14(1):9-20.
32. Remer R, Elliot J. Characteristics of secondary victims of sexual assault. *Int J Fam Psychiatry*. 1998a;9(4):389-401.
33. Remer R, Elliot J. Management of secondary victims of sexual assault. *Int J Fam Psychiatry*. 1998b;9(4):389-401.
34. Stamm BH, ed. *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers and Educators*. Lutherville, MD: Sidran Press; 1995.
35. Utterback J, Caldwell J. Proactive and reactive approaches to PTSD in the aftermath of campus violence: forming a traumatic stress reaction team. *J Traumatic Stress*. 1989;2(2):171-184.
36. Association AP. *The Diagnostic and Statistical Manual of Mental Disorders*. 4th ed. Washington DC: Author; 1994.
37. Reese J, Scrivner E, eds. *Law Enforcement Families: Issues and Answers*. Washington DC: United States Government; 1994.
38. Everly G. Familial psychotraumatology: an analysis of the impact of traumatic stress upon the law enforcement family via destruction of the familial weltanschauung. In: Reese J, Scrivner E, eds. *Law Enforcement Families: Issues and Answers*. Washington DC: U.S. Department of Justice and Federal Bureau of Investigation; 1994.
39. Comille TA, Meyers TW. Secondary traumatic stress among child protective service workers: prevalence, severity, and predictive factors. *Traumatology*. 1999;5(1).
40. Foreman WA. Police stress response to civilian aircraft disaster. In: Reese J, Horn J, Dunning C, eds. *Critical Incidents in Policing (Revised)*. Washington DC: U.S. Department of Justice and Federal Bureau of Investigation; 1991.
41. Horowitz M. Stress response syndromes: character style and brief psychotherapy. *Arch Gen Psychiatry*. 1974;31:769-781.
42. Lundin T, Bodegard M. The psychological impact of an earthquake on rescue worker: a follow-up study of the Swedish group of rescue workers in Armenia. *J Traumatic Stress*. 1993;6:129-139.
43. Bryant R, Harvey A. Post-traumatic stress reactions in volunteer firefighters. *J Traumatic Stress*. 1996;9(1):51-63.
44. Chrestman K. Secondary exposure to trauma and self-reported distress among therapists. In: Stamm BH, ed. *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers, and Educators*. Lutherville, MD: Sidran Press; 1999:p 29-36.
45. Follette V, Polusny M, Milbeck K. Mental health and law enforcement professionals: trauma history, psychological symptoms, and impact of providing service to child sexual abuse survivors. *Professional, Psych, Res and Pract*. 1994;25(3):275-282.
46. Harvey M. An ecological view of psychological trauma and trauma recovery. *J Traumatic Stress*. 1996;9(1):3-23.
47. Marmar CR, Weiss DS, Metzler T, et al. Stress responses of emergency services personnel to the Loma Prieta earthquake interstate 880 freeway collapse and control traumatic stress incidents. *J Traumatic Stress*. 1996;9(1):63-85.
48. McCarroll J, Ursano R, Fullerton C, Lundy A. Traumatic stress of a wartime mortuary anticipation of exposure to mass death. *J Nerv Ment Dis*. 1993;174(1):4-14.
49. Moran C, Britton N. Emergency work experience and reactions to traumatic incidents. *J Traumatic Stress*. 1994;7(4):575-585.
50. Pearlman L, Saakvitne K. *Trauma and the Therapist: Counselor Transference and Vicarious Traumatization in Psychotherapy with Incest Survivors*. New York: W.W. Norton & Co; 1995.
51. Wilkinson C. Aftermath of a disaster: the collapse of the Hyatt Regency Hotel skywalks. *Am J Psychiatry*. 1983;140:1134-1139.
52. Kassam-Adams N. The risks of treating sexual trauma: Stress and secondary trauma in psychotherapists. In: Stamm BH, ed. *Secondary Traumatic Stress: Self-Care Issues for Clinicians, Researchers, and Educators*. Lutherville, MD: Sidran Press; 1995:p 37-48.
53. Schauben L, Frazier P. Vicarious trauma: the effects of female counselors of working with sexual violence survivors. *Psychology of Women Quarterly*. 1995; (19):49-64.
54. Rogers ER. Professional burnout: a review of a concept. *Clinical Supervision*. 1987;5.
55. Black W. Military induced family separation: a stress reduction intervention. *Social Work*. 1993;38(3):273-280.
56. Jones F, Sparacino L, eds. *War Psychiatry*. 1st ed. Vol 1. Bethesda, MD: Office of The Surgeon General; 1995.
57. Breslau N, Davis GC, Peterson EL, Schutz L. Psychiatric sequelae of PTSD in women. *Arch Gen Psychiatry*. 1997;54:81-87.
58. Kessler RC, Sonnega A, Bromet E, Nelson CB. Post-traumatic stress disorder in the National Comorbidity Study. *Arch Gen Psychiatry*. 1995;52:1048-1060.
59. Stein MB, Walker JR, Hazen AL, Forde AL, Ready D. Full and partial PTSD: findings from a community survey. *Am J Psychiatry*. 1997;154(8):1114-1119.
60. World Disaster Report. Geneva: International Federation of Red Cross and Red Crescent Societies; 1993.
61. Bartone, PA, Adler and Vaitkus M. Dimensions of Psychological Stress in Peacekeeping Operations. *Mil Med*. 1998;163(9):587-593.
62. Litz B, AB E. Peacekeeping. In: Fink G, ed. *Encyclopedia of Stress*. Vol 3. San Diego, CA: Academic Press; 2000.
63. Litz BO, et al. Post-traumatic stress disorder associated with peacekeeping duty in Somalia for U.S. Military Personnel. *Am J Psychiatry*. 1997;154(2):178-184.
64. Orsillo S, Roemer L, et al. Psychiatric symptomatology associated with contemporary peacekeeping: an examination of post-mission functioning among peacekeeping in Somalia. *Traumatic Stress*. 1998;11(4):611-625.
65. Yarvis J. Clinical and cultural concerns in OOTW: a case study of HIV and Haiti. *AMEDD J*. October-December 2000; 45-51.
66. Weine SM, Becker DF, McGlashan TH, et al. Psychiatric consequences of "ethnic cleansing": clinical assessments and trauma testimonies of newly resettled Bosnian refugees. *Am J Psychiatry*. 1995;152(4):536-542.
67. Motta RW, Joseph JM, et al. Secondary trauma: assessing inter-generational transmission of war experiences with a modified Stroop procedure. *J Clin Psychology*. 1997;53(8):895-903.
68. Solomon Z, Levi G, Waysman M, et al. Secondary traumatization among wives of soldiers with combat stress reaction. *Harefuah*. 1993;124(12):750-756, 796.
69. Riesz GR. Intergenerational transmission of trauma: a legacy of Holocaust survivorship: a project based upon an independent investigation; 1991.
70. Everly G, Lating J, eds. *Psychotraumatology*. New York: Plenum Press; 1995.
71. Rosenheck RA, Fontana A. Warrior fathers and warrior sons: intergenerational aspects of trauma. In: Danieli Y, ed. *International Handbook of Multigenerational Legacies of Trauma*. New York: Plenum Press; 1998:p 225-242.

72. Zahava S. Combat Stress Reaction. *The Enduring Toll of War*. New York: Plenum Press; 1993.
73. Solkoff N. The Holocaust: survivors and their children. In: Basoglu M, ed. *Torture and its Consequences: Current Treatment Approaches*. Cambridge: Cambridge University Press; 1992:p 136-148.
74. Voelm C, Schwartz B. Signs and symptoms of PTSD in children. *J. Police Crim Psychology*. 1994;10(1):14-21.
75. FEMA. Workbook for developing an application for crisis counseling services for disaster victims. *November publication*. 1995;229(4).
76. Meichenbaum D. *A Clinical Handbook/Practical Therapist Manual for Assessing and Treating Adults with PTSD*. Waterloo, Canada: Institute Press; 1995.
77. Yehuda R, et al. Depressive features in Holocaust survivors with PTSD. *J Traumatic Stress*. 1994;7(4):699-704.
78. Nielson E. Factors influencing the nature of PTSD. In: Reese J, Horn J, Dunning C, eds. *Critical Incidence in Policing (Revised)*. Washington, DC: U.S. Department of Justice and the Federal Bureau of Investigation; 1991.
79. Jones, JG. Mental health intervention in the aftermath of a mass casualty disaster. *Traumatology*. 1999;5(2).
80. Figley CR, ed. *Compassion Fatigue: coping with STS disorder in those who treat the traumatized*. New York: Bruner/Mazel; 1995.
81. Miller K, Stiff J, Ellis B. Communication and empathy as precursors to burnout among human service workers. *Communication Monographs*. 1988; 55(250-265).
82. Krystal H. *Integration and Self-Healing*. Hillsdale, NJ: Analytic Press; 1988.
83. Lifton R. *The Broken Connection*. New York: Simon & Schuster; 1979.
84. Brady J, Guy J, Poelstra P, Brokaw B. Vicarious traumatization, spirituality and the treatment of sexual abuse survivors: a national survey of women psychotherapists. *Professional Psychology: Research and Practice*. 1999;30(4):386-393.
85. Horowitz M, Wilner N, Alvarez W. Impact of event scale: a measure of subjective distress. *Psychosomatic Med*. 1979;41:209-218.

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# Dental Readiness of ARNG Soldiers in the 7th Infantry Division

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*Due to the decrease in size of our Army, more Reserve Component (RC) soldiers, including Army National Guard (ARNG) soldiers, are being mobilized for deployments at an increasing rate. An important part of mobilization is the dental readiness of those deploying Army Reserve and ARNG soldiers. Historically, the dental readiness of Army Reserve and ARNG soldiers has been less than that of the Active Component (AC). The Tri-care Selective Reserve Dental Insurance Program was intended by Congress and the Department of Defense (DOD) to increase the dental readiness of the RC but participation in the program by Reservists has been disappointing and underutilized. Therefore, dental readiness must still be addressed during the mobilization of RC forces prior to deployment. This study found a 7th Infantry Division at Fort Carson, CO, with dental class 3 rate of 23.8% among deploying ARNG soldiers. During the same time period, the active duty soldiers stationed at Fort Carson, CO, had a dental class 3 rate of only .8%.*

## Introduction

The Army today is committed to measures to completely integrate the RC (Army Reserve and ARNG) into its structure. On 23 Jun 99, the new Chief of Staff of the Army, General Eric K. Shinseki, stated his vision of the integration of the RC with active duty forces. "Today I declare that we are the Army," Shinseki said. "Totally integrated with a unity of purpose. No longer the Total Army, no longer the one Army. We are The Army," he said, "and we will march into the 21st century as The Army." It is fully expected that due to the decreasing size of the Active Component, that the RC will play a more important part in deployments of our military to support our national interests. Increasing numbers of citizen soldiers are, in fact, being mobilized and integrated into forces around the world.

An important component of the integration of RC into The Army has been the activation of the multi-compo 7th Infantry Division. On 30 Jun 99, the 7th Infantry Division reactivated at Fort Carson, CO. The division is composed of an active duty headquarters element and three enhanced Separate Brigades (eSB) from the ARNG. The three eSB are the 39th from Arkansas, the 41st from Oregon, and the 45th from Oklahoma. The ARNG soldiers from these three eSB are now being deployed in various operations in support of our national interests. The ARNG soldiers from the 39th eSB and 41st eSB have been deployed to Saudi Arabia and Kuwait in support of

Operation Southern Watch. The ARNG soldiers from the 45th eSB are deploying to Bosnia in support of Stabilization Force (SFOR) 8. The ARNG soldiers from the 39th eSB are deploying to Bosnia in support of SFOR 9.

An important part of mobilization is the dental readiness of those deploying Army Reserve and ARNG soldiers. Historically, the dental readiness of Army Reserve and ARNG soldiers has been less than that of the AC. The Tri-care Selective Reserve Dental Insurance Program was intended by Congress and the DOD to increase the dental readiness of the RC, but participation in the program by Reservists has been disappointing and underutilized. Therefore, dental readiness must still be addressed during the mobilization of RC forces prior to deployment. Brigadier General R. Byrne, Commander of the 41st eSB, Oregon ARNG, 7th Infantry Division, called dental readiness "the biggest readiness issue in deploying Oregon ARNG soldiers to Operation Southern Watch."<sup>1</sup> Initially, 92 of 210 (43.8%) Oregon ARNG soldiers deploying to Operation Southern Watch in the Fall of 1999 were dental class 3 and considered nondeployable for dental reasons because of the likelihood of dental emergencies taking them away from duty within 12 months.

## Literature Review

A thorough understanding of the importance of

dental readiness is important for those who must plan for the mobilization and deployment of RC soldiers. Health Affairs Policy 97-020 states that the Policy for Standardization of Dental Classifications shall be applicable to both active duty and RC. Dental class 1 means that no dental treatment is required. Dental class 2 means the soldier needs routine dental treatment but a dental emergency is not probable within 12 months. Dental class 3 means the soldier has a dental condition that will probably escalate into a dental emergency within 12 months. Soldiers with unknown status, no examination nor treatment within the past 12 months, or without a complete dental record are considered dental class 4. Commanders' guidance in managing dental classes 3s and 4s are outlined in AR 600-8-101, AR 40-35, and AR 600-63.<sup>24</sup> Soldiers with incomplete dental records must receive a dental examination and make a complete dental record at their first duty station. Soldiers who are dental class 3 must have the class 3 condition remedied within 6 months of identification of a class 3 condition. Although the Dental Classification Standardization System applies to RC soldiers, they do not have a requirement for dental readiness and their dental readiness is currently not routinely monitored.

Historically, 20 to 25% of all soldiers will experience a dental emergency during a 1-year deployment. In 1943, the largest number of soldier complaints were lack of adequate dental support.<sup>5</sup> In the Korean War there were 133,720 dental visits that resulted in 493,441 dental procedures.<sup>6</sup> If a soldier requires evacuation to the rear due to a dental emergency, the average time the soldier is lost to the unit is 5 days.<sup>7</sup> Liewehr states that this leads to a potential 18,000 man-day loss to a division in a 1-year deployment.<sup>8</sup> Payne and Posey found a field dental emergency rate during peacetime of active duty personnel at Forts Irwin and Drum to be 21% of the total medical sick call in field exercises involving 24,500 active duty soldiers. They further determined that the dental emergency rate was 167 per 1,000 troops in 1 year. This resulted in an annual lost duty time of 121.5 days per thousand soldiers.<sup>9</sup> Ludwick et al found a dental emergency rate of 200 dental emergencies per 1,000 deployed personnel per year in Navy and Marine personnel in Vietnam.<sup>10</sup> Nasser and Storz found 14% of medical sick call reporting to an evacuation hospital during Desert Storm were dental emergencies.<sup>11</sup> The actual percentage of dental emergencies was higher because

many soldiers experiencing dental emergencies reported directly to field dental clinics and bypassed the 12th Evacuation hospital. Grover et al found an even higher dental emergency rate among Army recruits – 260 per 1,000 soldiers every 6 months – a rate of 520 dental emergencies per 1,000 soldiers per year.<sup>12</sup> Swan and Karpetz found a dental emergency rate of Canadian Military personnel in Somalia in 1993 to be 232 dental emergencies per 1,000 troops per year.<sup>13</sup> Lost time due to dental emergencies can have a tremendous impact on unit readiness.

It is important to track the dental classification of both active duty and RC deploying soldiers. Efforts to decrease the number of class 3 dental patients and increase the number of class 1 and 2 dental patients will result in a greatly reduced dental emergency rate and will decrease lost time due to dental emergencies for the unit. A study by King and Teweles found that the expected dental emergency rate of dental class 1 patients is only 67 dental emergencies per 1,000 soldiers per year. Class 2 patients have an expected dental emergency rate of 145 dental emergencies per 1,000 soldiers per year. Class 3 patients have an extraordinary dental emergency rate of 530 dental emergencies per 1,000 soldiers per year.<sup>14</sup> A unit with a high number of dental class 3 patients will have a great amount of lost duty time due to dental emergencies.

The RC soldiers, including ARNG soldiers, have a higher dental class 3 rate than the AC. It can therefore be expected that the dental emergency rate of the RC will be higher than that of the AC. This will result in more lost time due to dental emergencies unless they can be treated to dental readiness standards (dental class 1 or 2) at the time of mobilization prior to deployment. A study by Shulman et al found a class 3 rate for RC personnel at Fort Pickett, VA, from Jun through Sep 91, to be 57.8% class 3s.<sup>15</sup> This high rate of RC class 3s can be compared to the 1994 Tri-Service Comprehensive Oral Health Survey that found 14.5% of active duty personnel were class 3. The same tri-service study found that new recruits also had a higher class 3 rate that was comparable to the RC – 49.1% of new recruits were class 3. A study by Fearon of “Call Forward 95” in Alaska found a class 3 rate of 26.2% for Alaska RC personnel.<sup>16</sup> Wilhelm and Holzer found a class 3 rate of RC personnel to be 26% at Fort Indiantown Gap, PA, during the summer of 1995.<sup>17</sup> Chafin and Horning found a RC class 3 rate of 27.5% in “Call Forward 97” at

Fort Drum, NY.<sup>18</sup> In Desert Shield/Storm, the RC had a 27.2% class 3 rate upon mobilization.<sup>19</sup> The current study measured the class 3 rate of 7th Infantry Division deploying ARNG soldiers.

## Methods and Findings

The first group of ARNG soldiers mobilized for deployment by the 7th Infantry Division were members of the 39th eSB, Arkansas ARNG, in support of Operation Southern Watch. Fifty-two of the first 160 soldiers, or 32.5%, were class 3. The Arkansas ARNG decided to contract civilian dental resources to treat those first 52 class 3 soldiers. This resulted in a cost of approximately \$75,000 or \$1,442 per class 3. The Arkansas ARNG decided to contact the Fort Carson Dental Activity and coordinate the treatment of future class 3 soldiers mobilizing to deploy in order to reduce costs to the Arkansas ARNG. Final dental classification prior to deployment took place at Fort Carson by members of the Fort Carson Dental Activity. Treatment of remaining or newly identified class 3 patients was accomplished by the Fort Carson Dental Activity. A U.S. Army Medical Command legal interpretation of Title 10 USC 1074a(d)(1) determined that Dental Activities can start treating deploying RC soldiers 75 days before deployment.

The second group of ARNG soldiers mobilized for deployment by the 7th Infantry Division were members of the 41st eSB, Oregon ARNG, in support of Operation Southern Watch. Initially, 92 of 210 (43.8%) Oregon ARNG mobilizing soldiers were class 3. A senior dentist from the Fort Carson Dental Activity went to Oregon and with Oregon ARNG dentists, a Soldier Readiness Processing (SRP) exercise was conducted. Strict adherence to the DOD Instruction 6410.1 (Standardization of Dental Classification, 8 Nov 90) resulted in the identification of 47 class 3s out of 210 soldiers (22.2%). Treatment of these class 3 soldiers to dental readiness standards was coordinated using a variety of available resources. The 7th Infantry Division paid travel costs for two active duty Fort Carson dentists and two dental assistants to go to Oregon for 1 week and treat some of the dental class 3 personnel. The two Fort Carson dentists were credentialed at two Veterans Affairs dental clinics in Oregon and were given space and supplies by the Veterans Affairs dental clinics to treat the dental class 3 soldiers. Oregon ARNG dental personnel treated other dental class

3 soldiers during weekend drills. Still other dental class 3 soldiers were treated by members of the Fort Lewis Dental Activity at Fort Lewis. The remaining dental class 3 soldiers were treated to dental readiness standards at Fort Carson during final mobilization and SRP prior to deployment.

At the time this article was written, members of the 45th eSB, Oklahoma ARNG, were preparing to deploy to Bosnia in support of SFOR 8. A senior dentist from the Fort Carson Dental Activity traveled to Oklahoma to participate in the initial identification of dental class 3 personnel. Twenty-three of 180 soldiers were identified as class 3 (12.8%) and were treated by members of the Fort Sill Dental Activity in Oklahoma and by members of the Fort Carson Dental Activity during mobilization exercises at Fort Carson, CO. Final dental examination and treatment prior to deployment took place at Fort Carson by members of the Fort Carson Dental Activity.

Personnel from the 39th eSB, Arkansas ARNG, were identified for mobilization and deployment in support of SFOR 9 in Bosnia. A senior dentist from the Fort Carson Dental Activity traveled to Arkansas to participate in the initial identification of dental class 3 personnel. Sixty-one of 220 (27.7%) personnel were determined to be class 3. Their dental treatment was coordinated and consisted of treatment by two Arkansas ARNG dentists and two assistants who traveled to Fort Carson and were given space and supplies to treat the deploying personnel. Members of the Fort Carson Dental Activity treated the remaining class 3 personnel. Final dental examination and treatment prior to deployment took place at Fort Carson by members of the Fort Carson Dental Activity.

Overall, this study tracked 770 ARNG soldiers with the 7th Infantry Division who have mobilized for various deployments. One hundred eighty-three of those 770 soldiers, or 23.8%, were identified as dental class 3 and required treatment to dental readiness standards. A review of the treatment plans for those class 3 personnel found that 360 appointments were required to treat the 183 personnel to dental readiness standards (1.97 appointment/class 3 patient). During "Call Forward 95" in Alaska, the class 3 personnel needed an average of 2.82 appointments per class 3 patient.<sup>20</sup> The dental readiness of these ARNG 7th Infantry Division eSB soldiers can be compared to the

dental readiness of active duty soldiers. The active duty soldiers of Fort Carson, CO, in July of 2000, had a dental readiness of 95.2%), a dental class 3 rate of only .8%, and a dental class 4 rate of 4.0%. A class 3 rate of 23.8% for the ARNG soldiers is significantly higher than the active duty soldier rate of only .8%. The high dental class 3 rate can interfere with mobilization efforts prior to deployment.

## Lessons Learned and Recommendations

- The dental readiness of RC soldiers is much less than that of the active duty soldiers. In this study, the class 3 rate of deploying ARNG soldiers was 23.8% compared with only .8% for active duty soldiers. Planners will have to address the dental readiness of deploying RC soldiers during mobilization. A U.S. Army Medical Command legal interpretation of Title 10 USC 1074a(d)(1) states that Dental Activities can start treating deploying RC soldiers 75 days before deployment.

- The first step in treating deploying RC soldiers should be an accurate definition of the problem. Initially, 92 of 210 (43.8%) Oregon ARNG mobilizing soldiers were class 3. A senior dentist from the Fort Carson Dental Activity went to Oregon and with Oregon ARNG dentists a SRP exercise was conducted. Strict adherence to the DOD Instruction 6410.1 (Standardization of Dental Classification), resulted in the identification of 47 class 3s out of 210 soldiers (22.2%). A senior dentist should travel to the initial SRP site and participate in the SRP.

- Treatment of deploying RC soldiers can be accomplished by a variety of resources. The State may provide contract dollars for civilian dentists to treat deploying ARNG soldiers. There may be local RC dentists available to treat deploying RC soldiers both at home station and at the mobilization site. The RC soldiers should be encouraged to utilize the Tri-care Selective Reserve Dental Insurance Program. Dental Activities in close physical proximity to deploying RC soldiers as well as the Dental Activity at the mobilization site can be utilized to treat the deploying soldiers. Active duty dentists may be credentialed to provide dental treatment at sites close to the deploying soldier's home station in order to facilitate treatment.

- Accurate accounting of resources utilized to treat deploying RC soldiers should be kept so that resources

may be requested from the appropriate source to help defray the costs, including TDY costs, of treating these soldiers. The 7th Infantry Division paid for all TDY costs in this study and provided funds to purchase field equipment, including X-ray equipment at the SRP site.

- The senior dental planner should communicate with the leadership responsible for deploying RC soldiers in order to facilitate treatment and discuss issues relating to the treatment of those RC soldiers. There may be times when treating mobilizing RC soldiers may decrease from available treatment of active duty soldiers at the mobilization site.

- Experience revealed that approximately 50 soldiers could be examined in 1 day by one dentist. To facilitate the dental portion of the SRP, provide three auxiliaries for each dentist at the SRP site – one dental assistant, one X-ray technician, and one MOBLAS/DENTRAD administration person.

- Installing X-ray equipment, including panograph, at the SRP site helps facilitate examination on site. It is important to have computer support with links to the local Dental Activity to facilitate digitized tracking of deploying soldiers with all required computer-tracking programs.

- The following formula can be used by dental planners to estimate resources required to treat deploying RC soldiers:

Formula to estimate required dental resources to treat deploying RC personnel	
Total No. of soldiers at SRP	
<hr/>	
50 soldiers/ one dental + three ancillary personal	+ Total No. of deploying soldiers X% class 3s X average No. of appointments to treat a cl 3 to 2

- This study found a dental class 3 rate of 23.8% and an average number of appointments required to treat dental class 3 patients to dental class 2 (minimal dental readiness) to be 1.97. The average dental class 3 rate of deploying RC soldiers during Desert Shield/Storm was 27.2% and Call Forward 95 found that an average number of appointments required to treat dental class 3 patients to dental class 2 was 2.82. A reasonable planning factor of a 25% dental class 3 rate is consistent for larger populations but may not be accurate for small RC populations.



## Conclusion

The low dental readiness and high percentage of dental class 3s of RC soldiers when compared to active duty soldiers (23.8% class 3s vs .8% class 3s) must be considered when mobilizing RC soldiers for deployment. The senior dental planner for deploying RC soldiers should consider all resources listed in this study as potential methods of treating RC soldiers to readiness standards. Early communication with leadership responsible for the deployment of RC soldiers is necessary to facilitate treatment and to discuss all issues related to that treatment.

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## References

1. 7th Infantry Division Strategic Planning Conference, Fort Carson, Colorado; April 2000.
2. AR 600-8-101; December 1989.
3. AR 40-35; March 1989.
4. AR 600-63; November 1987.
5. Jeffcott GF. A History of the U.S. Army dental Services in World War II. Washington: Government Printing Office; 1955.
6. United States Department of the Army. Field Manual 8-55, Army Medical Services Planning Guide (U) Washington: Government Printing Office; 1960.
7. Allen FW, Smith BE. Impact of dental sick call on combat effectiveness: the dental fitness class 3 soldiers. *Mil Med.* 1992;157: 200-3.
8. Liewehr, F (COL). U.S. Army Dental Corps, Endodontics and Dental Readiness. *Mil Med.* 2000;165, 2:127.
9. Payne TF, Posey WR. Analysis of dental casualties in prolonged field training exercises. *Mil Med.* 1981;146:265-71.
10. Ludwick WE, Pogas JA, Gendron EG, Weldon AL. Dental emergencies occurring among Navy-Marine personnel serving in Vietnam. *Mil Med.* 1974;139:121-3.
11. Nasser FE, Storz JP. Report on dental casualty treatment at 12th Evac. *Army Med Dept J.* 1994;10:38-42.
12. Grover PS, Carpenter WM, Allen GW. Predictability of dental emergencies by panography. *Mil Med.* 1983;148:148-9.
13. Swan ES, Karpetz E. Dental casualties during Canadian UN operations in Somalia. *J Can Dent Assoc.* 1995;61:991-7.
14. King JE, Teweles RK. Impact of troop dental health on combat readiness. *Mil Med.* May 1987;152:230-235.
15. Shulman JD, Williams TR, Tupa JE, et al. A Comparison of Dental Fitness Classification Using Different class 3 Criteria. *Mil Med.* 1994;159:1:005.
16. Fearon CG. Dental Processing of RC Forces During Mobilization. *AMEDD J.* September-October 1996.
17. Wilhelm RJ, Holzer GJ. An Evaluation of Dental Readiness in Reserve and ARNG Troops. *ARMED J.* May-June 1997;p 39-40.
18. Chafin J, Horning T. RC Dental Readiness in Operation "Call Forward 97." *AMEDD J.* October-December 1998.
19. Dental Implications in a Theater of Operations. *Dept of Den Sci.* 1994.
20. Fearon CG. Dental Processing of RC Forces During Mobilization. *AMEDD J.* September- October 1996.

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# BOOK REVIEW

**POX AMERICANA** by Elizabeth A. Fenn. *New York: Hill and Wang, 2001 (ISBN 0-8090-7820-1, \$25.00).*

*Reviewed by Dr Wayne R. Austerman, Historian, U.S. Army Medical Department Center and School, Fort Sam Houston, TX.*

It virtually depopulated large areas of Spanish California, frightened George Washington more than the entire British Army, claimed victims as far north as the Canadian subarctic, and crippled an early effort to emancipate southern slaves by enlisting them into military service. It was the great North American smallpox epidemic of 1775-1782, which claimed at least 130,000 lives across the continent and, while little remembered today, exerted a fateful impact upon the destinies of all the population groups which it struck, from Hudson's Bay southward to the Sea of Cortez.

George Washington University historian Elizabeth A. Fenn has written a fascinating account of how trade, travel, revolution, and war served as vectors of disease as well as agents for political and economic progress. Fenn relates how Canada very nearly became a part of the United States when an American force besieged British-held Quebec during the winter of 1775-1776 under the bold leadership of an audacious young officer named Benedict Arnold, only to be crippled as smallpox swept through its ranks, forcing the abandonment of the expedition. Four years later, the governor of Spanish Texas first exulted over how the ravages of smallpox had crippled the

province's Apache and Comanche enemies as the epidemic reached the southern plains, only to subsequently lament that the settlement of San Antonio "was so infected with the said contagion" that he was "reduced to the greatest consternation." The town had no doctor and no medicines, while the number who had fallen ill was "uncountable . . . one does not hear or see anything day or night except the tolling of bells and the sight of burials." Fenn depicts with clarity and insight how the disease "moved incrementally through incidental encounters, yet it also seemed to move with a purpose." Describing the **Variola** as a "virus of empire," she explains how it "made winners and losers, at once serving the conquerors and determining whom they would be. Smallpox reshaped political and military relations across the continent, even as the Revolution reshaped such relations around the world."

In a time when old hatreds and ancient creeds again surge across the globe and Americans have learned anew the meaning of the phrase "fear in a handful of dust," Fenn's gripping book is a valuable contribution to the way the Army Medical Department and the nation it serves can gain insight on the fateful interrelationships of civilization, war, and disease.

# AMEDD DATELINE

Dr Wayne R. Austerman, PhD†

- 1 Jan Chimborazo Military Hospital in Richmond, VA, became the largest medical facility in the world, capable of housing 4,800 casualties, with 150 wards, kitchens, a bakery, dairy herd, and icehouse on 125 acres. **(1864)**
- 12 Jan Private first class Gus Streeter died in Indianapolis, IN, at the age of 105. One of less than 2,500 surviving World War I veterans, Streeter was already a trained pharmacist when he served in 1918, seeing combat action in France. Posted to an artillery unit, he suffered shrapnel wounds in both legs, but feared he would be shipped home if he reported to an aid station. Instead he treated his own wounds and remained on duty with his comrades. Because the wounds were not documented, Streeter did not receive a Purple Heart until November 1999, when a special award of the decoration was made to him. **(2000)**
- 28 Jan Captain James Fisher, Battalion Surgeon, 6th Ranger Battalion, was mortally wounded by shrapnel during his unit's raid to liberate 511 Americans from the Japanese prisoner of war camp at Cabanatuan, Philippine Islands. Two newly-freed prisoner of war physicians, Drs Merle Musselman and Herbert Ott, a veterinarian, volunteered to stay behind with Fisher as the Rangers made a hurried withdrawal in the face of enemy pursuit, but the surgeon died soon afterward. **(1945)**
- 29 Jan Double amputee Harold Russell died of a heart attack in a Needham, MA, nursing home. Russell, who lost both hands in service during World War II, won two Academy Awards for his portrayal of a handicapped war veteran in the classic 1947 film THE BEST YEARS OF OUR LIVES. He subsequently helped establish the disabled veterans' advocacy group, AMVETS. **(2000)**
- 30 Jan As King George III of England lapsed into fits of insanity, he was placed under the care of the Reverend Dr Francis Willis, who specialized in treating psychiatric disorders among the English nobility. Doctor Willis had the king bound and gagged on this date after the monarch repeatedly interrupted the physician's lecture on his intended course of treatment. **(1789)**
- 17 Feb An undetermined number of wounded Confederate soldiers housed in an emergency field hospital established at South Carolina College were burned alive when General William T. Sherman's troops set ablaze the city of Columbia, SC. **(1865)**
- 15 Mar Private Henry Nourse, 156th Pennsylvania Infantry, survived the amputation of a leg, but suffered what he described as agonizing pain in his now absent toes. **(1865)**
- 30 Mar Lieutenant John W. Davidson led 60 troopers of the 1st U.S. Dragoons into a 3-hour long fight with Jicarilla Apaches near Cieneguilla (modern Pilar), New Mexico. Twenty-two dragoons were killed and every other man, including Davidson and Assistant Surgeon Magruder, was wounded in the bitter fighting in the Embudo Mountains, southwest of Taos. **(1854)**

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## Combat Medic Prayer

*Oh Lord, I ask for the divine strength to meet the demands of my profession. Help me to be the finest medic, both technically and tactically. If I am called to the battlefield, give me the courage to conserve our fighting forces by providing medical care to all who are in need. If I am called to a mission of peace, give me the strength to lead by caring for those who need my assistance. Finally, Lord, help me to take care of my own spiritual, physical, and emotional needs. Teach me to trust in your presence and never-failing love.*

*Amen*



## **WRITING AND SUBMITTING ARTICLES FOR THE AMEDD JOURNAL**

*The AMEDD Journal is published quarterly to expand knowledge of domestic and international military medical issues and technological advances; promote collaborative partnerships among Services, components, Corps, and specialties; convey clinical and health service support information; and provide a peer-reviewed high quality print medium to encourage dialogues concerning health care initiatives.*

### **Submit manuscripts with the following guidelines:**

- 1. Manuscripts will be reviewed by the Journal's Editorial Board and, if appropriate, forwarded to the appropriate Subject Matter Expert for further assessment.*
- 2. It may be necessary to revise the format of a manuscript in order to conform to established page composition guidelines.*
- 3. Articles should be submitted in disk form (preferably Microsoft Word on 3.5" disk) accompanied by two copies of the manuscript. Journal format requires four double-spaced typewritten pages to complete one page of two-column text. Ideally, manuscripts should be no longer than **20 to 24 double-spaced pages**. Exceptions will be considered on a case-by-case basis.*
- 4. The American Medical Association Manual of Style should be followed in preparation of text and references. Abbreviations should be limited as much as possible. A list identifying abbreviations and acronyms **must** be included with the manuscript or materials will be returned to the author.*
- 5. Photos submitted with manuscripts can be black and white or color. Color is recommended for best print reproduction quality. Space limitations allow no more than eight photos per manuscript. Photo prints are preferred, but we will accept electronic graphic (i.e., BMP, JPG, or GIF) and photo files in Microsoft Word or PowerPoint. Avoid excessive use of color and shading. Please do not send photos embedded in PowerPoint. Slides, negatives, or X-ray copies will not be published. To avoid possible confusion, the top of photos should be marked on the reverse and their position within the article should be clearly indicated in the manuscript. Photo captions should be taped to the back of photos or submitted on a separate sheet.*
- 6. A complete list of references used in the text **must** be provided with the manuscript. Each should provide the author's last name and initials, title of the article, name of the periodical, volume and page number, year of publication, and address of the publisher.*
- 7. Drugs should be listed by their generic designations. Trade names, enclosed in brackets, can follow.*
- 8. The author's name(s), title, current unit of assignment, PCS date (if applicable), and duty phone number **must** be included on the title page.*
- 9. Submit articles to: COMMANDER, U.S. ARMY MEDICAL DEPARTMENT CENTER & SCHOOL, ATTN MCCS HSA, 2250 STANLEY ROAD STE 250, FORT SAM HOUSTON TX 78234-6150. DSN 471-6916/7326, Comm (210) 221-6916/7326, FAX DSN 471-8720, Comm (210) 221-8720.*



